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Directory of All Currently Available Drug Carrier and Drug Delivery Systems

PEGylation - Poly(amino acids) - PASylation - Pentrimers

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Content

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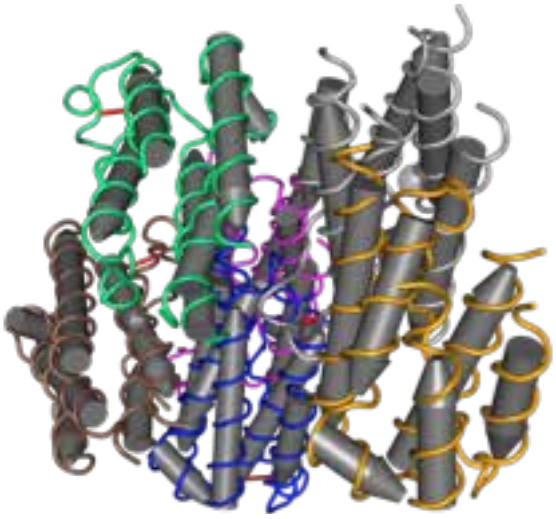
Introduction

The Biopharmaceuticals market, estimated at US$ 200 billion globally in 2013 by reportbuyer.com (Biopharmaceuticals - A Global Market Overview, 2013, London), is further projected to reach US$ 500 billion by 2020, growing at 13.5 % CAGR between 2010 and 2020. Among different product sectors, monoclonal antibodies (mAb) constitute the largest segment in the global biopharmaceuticals market, accounting for an estimated share of 25.6 % in 2013, equating to US$ 51.1 billion. In terms of therapeutic areas, neurology application is the largest market for global biopharmaceuticals with an estimated share of 28.2 % valued at US$ 56.3 billion (2013), and is further expected to reach a projected US$ 144.5 billion by 2020. Product segments analyzed in this study comprise monoclonal antibodies (mAb), erythropoietin, biotech vaccines, recombinant human (RH) insulin, granulocyte colony-stimulating factor (G-CSF), interferons, human growth hormones (HGH) and others. Therapeutic areas analyzed include neurology, infectious diseases, diabetes, oncology, cardiovascular disease and others.

Proteins and other Biopharmaceuticals have a high potential as drugs due to their specificity and efficacy, but show poor pharmacokinetic properties. Attaching polymers which are tolerated by the physiologic system, such as poly(amino acid), poly(ethylene glycol) or other variants improves drastically their bioavailability and biodistribution and turns sensitive biomolecules into robust drugs.



Interferon, one of the first PEGylated biopharmaceuticals in the market

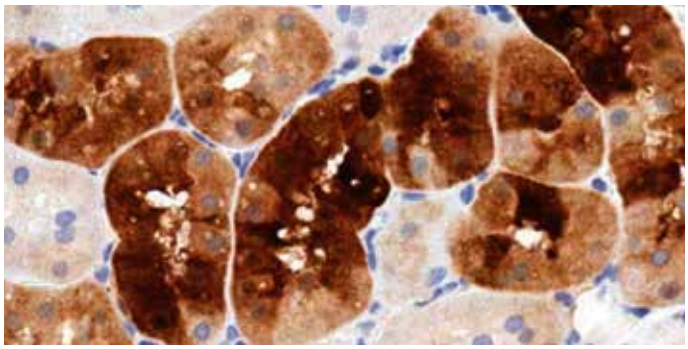
The big advantage of proteins, antibodies, siRNA, and other natural products in their use as drugs is their high specificity in combination with low side effects. Normally they interact with the dedicated target only and thus do not show unwanted activities and side effects at any other place in the body. A current focus is the study of modern drug carrier systems where biotolerable linkers are connecting a recognition part with a drug-active part.

Conjugations can reach the size of a nanoparticle. The recognition part can be a peptide or hormone which binds specifically to the surface of a certain cell. After internalization of the whole nanoparticle, the active part (DNA or siRNA, for example) is released. Inhibition or activation of certain enzymes or the nucleus follows with the consequence to repair the sick cell or to shut it down by initiating apoptosis or other mechanisms. Is the recognition part somehow specific to a certain individual, the drug system becomes personalized ("Personalized / Stratified Medicine"). In conjugation with hydrophobic compounds forming amphiphilic and biodegradable block-copolymers like PEG-PLA (polylactic acid) and PEG-PLGA (co-polylactic acid-glycolic acid), sophisticated micelles are formed where drug molecules can be masked and protected against attacks by the immune system.

Modern biopharmaceuticals are ideal drugs. However, their significant drawback is their low stability under physiological conditions. Due to the fact that they are similar to biological components, they are also easily attacked by the immune system of the body, i.e. by antibodies and degradation enzymes. Many efforts have been made by highly sophisticated formulation techniques, special application methods (depots) and chemical modifications to improve their pharmacokinetic properties. One approach that shows much better results than other methods tried in the past, is Polymer Therapeutics, i.e. attaching polymers to the active component.

Poly(ethylene glycol) (PEG) is the most frequently used polymer and also the gold standard for stealth polymers in the emerging field of polymer based drug delivery. The first approved PEGylated products are on the market for over 20 years now. Since then, a vast amount of clinical experience has been gained with this polymer – not only benefits, but also possible side effects and complications have been found.

The area that needs more intensive and careful examination is the non-biodegradability of PEG and thus possible accumulation in the body resulting in formation of vacuoles and vesicles.



PEG immunoreactivity in kidney from rats given 100 mg/kg 10kPEG IV. There is variable but diffuse PEG staining in tubular epithelial cells throughout the renal cortex. PEG staining is not associated with epithelial cell vacuolation (Magnification 230x).

Cytoplasmic vacuoles (arrows) are associated with variable levels of PEG immunoreactivity in the kidney (300x) in rats given 100 mg/kg 40kPEG. The cortical tubule and choroid plexus had both darkly stained and clear vacuoles.

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Therefore, in recent years many new polymers have been developed, namely polymers of naturally occurring amino acids, either as homopolymer (as in the case of arginine, glutamic acid, ornithine and sarcosine) or as mixed polymer (PASylation). As polypeptides they have significantly better biodegradability than PEG and are highly tolerable. Whenever amino acids with functional side chains have been used, an additional advantage is that not only large biomolecules like antibodies or proteins can be attached. Attachment of small molecules is now possible and opens this drug delivery technology also to this type of drug compounds. Furthermore, several active compounds can be attached on the same carrier, which opens the door to sophisticated applications of combination therapy. Paclitaxel combined with a cyclic RGD peptide attached to PGA was already in clinical phase III in 2014.

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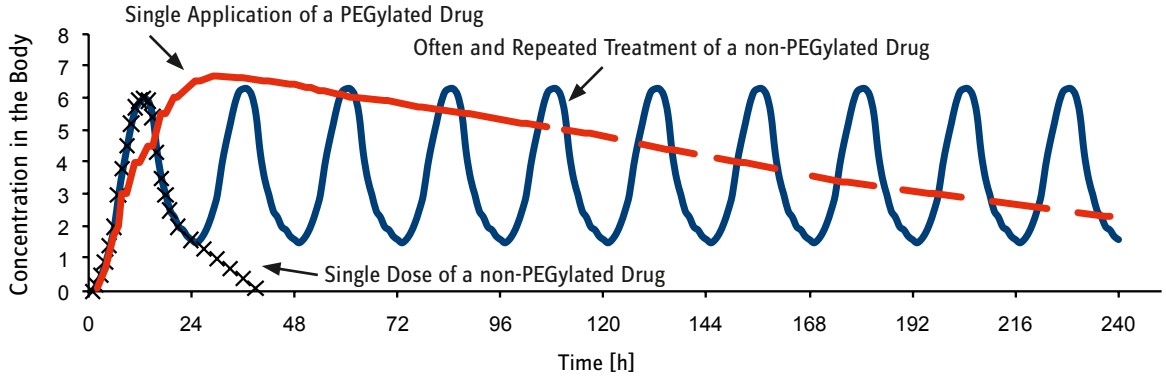
1. Basics and Principles of Polymer Therapeutics

1.1 Pharmacological Effects

Small drug molecules and also large biomolecules like proteins or antibodies suffer rapid clearance from human body. The concentration of the drug compound drops rapidly as it is removed from the body. Treatment has to be repeated in order to keep the concentration over the therapeutic threshold. Otherwise immunogenic reactions start.

There are two major reasons why polymer therapeutics improves drug delivery and pharmacokinetics: Polymer-drug conjugates show suppressed renal clearance and reduced immunogenic reactions. The concentration is being reduced very slowly over the time of treatment. In the ideal case, only a single application is required over the time of treatment. This is due to the following two mechanisms:



Pharmacokinetic properties of a PEGylated drug in comparison to a non PEGylated drug.

1) Preventing Degradation and Reducing Immunogenicity

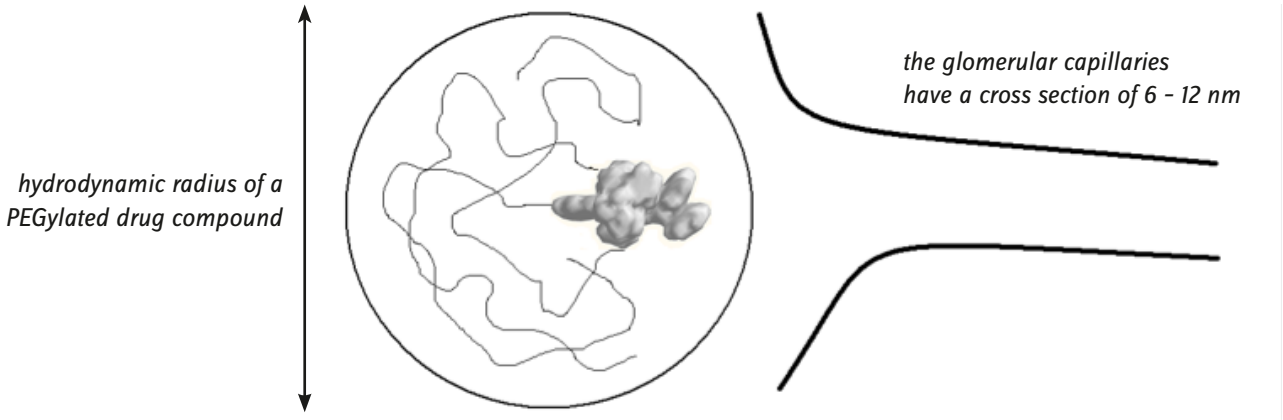
Polymer chains are covering the surface of a biopharmaceutical and thus effectively shield it against attacks by the immune system. The polymeric shield has characteristics rather like a solvent than a protein.

This prevents uptake by cells of the retinal endothelial system (macrophage system). Recognition by the immune system (antibodies, proteases and other degradation enzymes etc.) is significantly reduced. The drug stays intact and is not destroyed (degraded or metabolized) during its presence in the body and journey through the physiological system.

2) Preventing Excretion

Poly(amino acids), PEG and PAS are naturally very hygroscopic and surrounded by a large solvating sphere of water. Thus the overall so-called "hydrodynamic radius" is increased to an order of magnitude which is larger than the diameter of the glomerular capillaries (6 to 12 nm). Therefore, the drug is not excreted through the kidneys and simply stays longer in the body.

Retarded renal filtration prolongs plasma half-life of the biological drug by means of a purely biophysical size effect, without any receptor interactions that may influence pharmacodynamics or lead to side effects.



These two main effects, i.e. preventing degradation and excretion, lead to a set of advantageous properties of polymer therapeutic drugs. The polymer forms a random conformation which is stable under native buffer conditions and body temperature and generates a large hydrodynamic volume, thus increasing the apparent size.

Through the choice of different chain lengths and polymer design the hydrodynamic volume can be adjusted within broad limits.

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1.2 Polydispersity

The polymers in this context are a polymeric linear structures with n repeating units of monomers. Depending whether the polymer is consisting of one single molecular weight (only one n existing) or of a range of compounds with an average mass and a distribution of n around a mean value, polymers are referred to as "*monodisperse*" or "*polydisperse*". If the polymer is polydisperse it shows a mass spectrum as shown in the figure. In order to quantify the distribution of the molecular weight, the **Polydispersity D** is defined as the ratio between the weight average molecular weight $\mathbf{M}_w^\circ$ and the number average molecular weight $\mathbf{M}_n^\circ$. The weight average molecular weight does not "count" species just by their number, but takes into account the total weight of each species and is therefore a much more realistic indicator of the gross mechanical property. For a homogeneous sample, where the polymer chains have all the same length, M_w° is equal to M_n°, the polydispersity D is then equal to 1 and the sample is referred to be monodisperse.

Whenever there is a distribution of molecular weights, the weight average M_w° is always greater than the number average M_n° and the polydispersity is greater than 1. The polydispersity D of PEGs, PGAs and PSRs typically used in polymer therapeutics is between 1.05 and 1.20. Though, whenever a PEGylated new drug compound needs to be approved by EMEA, FDA and other authorities, it is easier and faster if this compound shows only one signal in the mass spectrum and not a distribution pattern. Therefore the need for high molecular weight but monodisperse compounds is increasing. PAS polymers are the choice in this case. As they are produced through recombinant methods, only one specific molecular weight exists although it is a large molecule.

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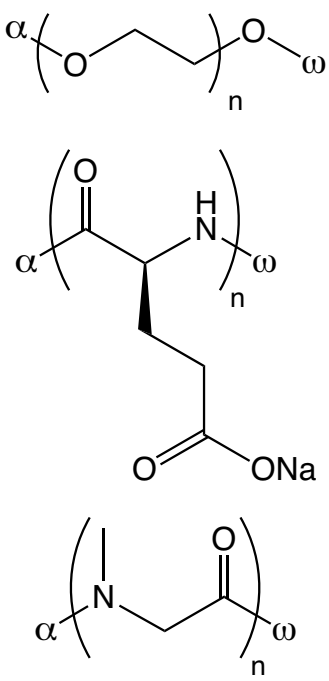
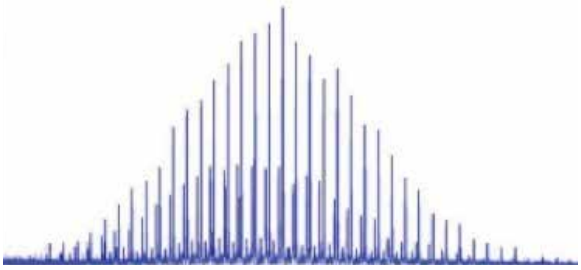


Poly(ethylene glycol), poly(glutamic acid) and polysarcosine are polymeric linear structures with repeating polyethylene oxide, glutamyl, or sarcosyl units, respectively.



Mass spectrum of a polydisperse polyethylene glycol showing the typical signals with a difference of: m/z = 44

$$D = \frac{M_w^\circ}{M_n^\circ} \geq 1 \text{ with } M_w^\circ = \frac{\Sigma N_x M_x^2}{\Sigma N_x M_x} \text{ and } M_n^\circ = \frac{\Sigma N_x M_x}{\Sigma N_x}$$

Whenever there is a distribution of molecular weights, the weight average M_w° is always greater than the number average M_n° and the polydispersity D is greater than 1.

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1.3 Alternative Carriers for Polymer Therapeutics

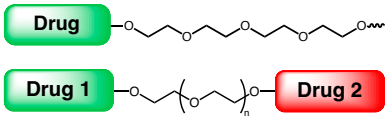
Polymer Therapeutics (PT) can be underlined as the most successful first generation nanomedicines according to the 2014 report on the US Top 10 selling drugs that include the polymeric drug Glatiramer acetate for multiple sclerosis (Copaxone®, Teva Pharm; $3.7 billion), and the polymer conjugate Pegfilgrastim for the treatment of neutropenia (Neulasta®, Amgen; $3.6 billion). Poly(ethylene glycol) (PEG) is still the most frequently used polymer so far and also the gold standard for stealth polymers in the emerging field of polymer based drug delivery. The increasing use of PEG and PEGylated products in pharmaceutical research and on the market not only provides new insight into the underlying mechanism of the beneficial properties of PEG, it also increased the likelihood of encountering potentially unfavorable effects.

These can be divided into several groups:

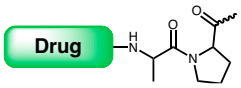
- adverse side effects in the body can be provoked by the polymer itself or by side products formed during synthesis that lead to hypersensitivity.
- unexpected changes in the pharmacokinetic behavior can occur with PEG-based carriers.
- non-biodegradability of PEG.
- synthetic and analytical challenges arise from the fact that larger PEGs are polydisperse which leads to difficult analytical characterizations of both the drug compounds and related impurities.

Single Terminal Conjugation

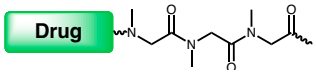
PEG – Poly(ethylene glycol)



PAS – Proline-Alanine rich sequence



NEW: PSR - PolySarcosine

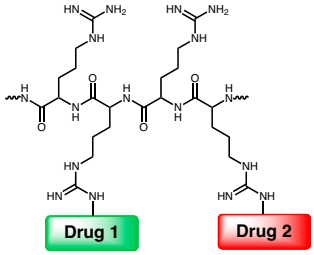


Terminal conjugation with and cross-linkage between larger drug molecules:

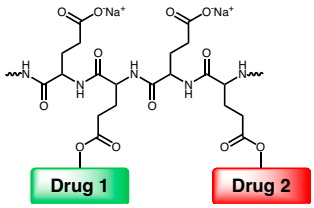
Biopharmaceuticals, therapeutic proteins, antibodies

Multiple Conjugation: Terminal & Side Chain

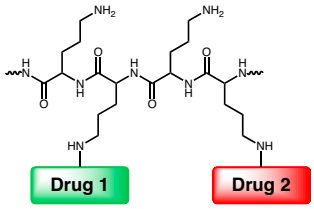
NEW: PAR – PolyArginine



PGA – Poly(Glutamic acid)



NEW: POR – PolyOrnithine

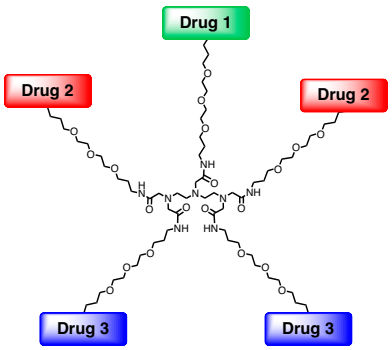


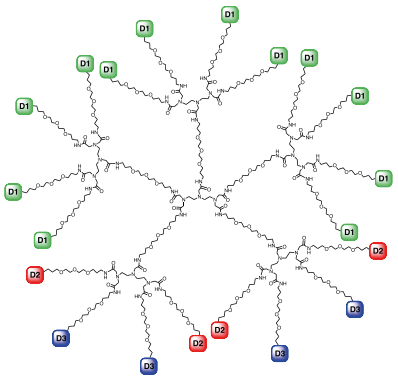
Both small and large drug molecules;

specific advantage for combination therapy and personalized medicine

Multiple Dendritic Conjugation

Pentrimer





Both small and large drug molecules;

specific advantage for combination therapy, personalized medicine and diagnostics

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In particular the non-biodegradability of PEG led to the fact that plenty of new carriers have been developed. Most of them are based on poly(amino acids). The repeating functional group is an amide bond, just like in any natural peptide and protein. Proteases thus can hydrolyze the polymer and degrade the whole conjugate. Larger molecular weights and higher doses for application are possible. Each polymer carrier technology has its specific characteristics and strong points for certain application fields (see scheme on left page).

PEG, PAS and PSR are linear polymers. Conjugation is only possible on the termini. Terefore, these types of carriers are mostly conjugated with larger molecules like antibodies or therapeutic proteins. PAS and PSR overcome the major drawback of PEG, i.e. its non-biodegradability. PAS is a recombinantly produced polymer, therefore strictly monodisperse. The advantages are excellent biodegradability and good analytics. The drawback is that application is limited to recombinant production of biopharmaceuticals only. Chemical conjugation is possible, however, only to a very limited extent.

PSRs are polydisperse just like PEG. They are peptoids and can therefore be degraded by proteases. Higher molecular weights and higher doses can be applied. A large variety of PSRs with different functional groups are readily available and others can easily be designed.

Poly(amino acids) of monomers with reactive side chains open the field of polymer therapeutic also to small molecules which can be conjugated to the polymer backbone through both terminal and plenty of side chain conjugations. Multiple loading can be achieved and also loading with several and different drug compounds or analytical or therapeutic agents. Combination therapy, personalized medicine and diagnostics are applications that are very easily accessible through these new carriers.

A fascinating concept are Pentrimers which can carry up to three different conjugates on the same pentavalent center molecule of a first generation dendrimer. Higher generations offer multiplex conjugations for sophisticated applications in therapy and diagnostics.

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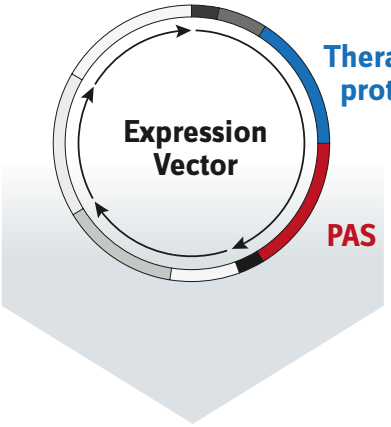
1.4 PASylation: Technology for Recombinant Productions

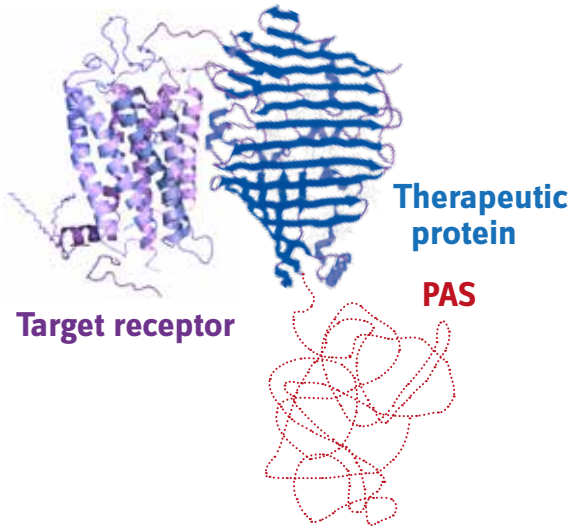
The genetic fusion with conformationally disordered polypeptide sequences composed of the amino acids Pro, Ala, and Ser ('PASylation') provides a simple way to attach a solvated random chain with large hydrodynamic volume to the protein of biopharmaceutical interest. This amino acid string adopts a bulky random coil structure which significantly increases the size of the resulting fusion protein, similar to chemical attachment of polyethylene glycol (PEG). By this means the typically rapid clearance of the biologically active component via kidney filtration is retarded by 1-2 orders of magnitude. Compared to other strategies to prolong the plasma half-life of biopharmaceuticals, the PAS-technology possesses several advantages.

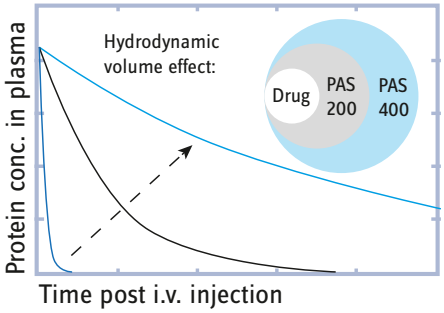
Most of the commercially successful first generation biopharmaceuticals are small proteins that suffer from rapid renal clearance, leading to disappointingly short circulation times. Chemical conjugation of such therapeutic proteins with the random coil polymer PEG to extend their effective size beyond the threshold of kidney filtration has emerged as an established strategy to prolong their plasma half-lives to a clinically useful range.

However, the chemical coupling of a biologically active protein with synthetic polymers has drawbacks with respect to biopharmaceutical development and production. Suitable PEG derivatives are expensive, especially as high chemical purity is needed, and their conjugation with a recombinant protein requires additional *in vitro* processing and purification steps which lower the yield and raise the costs. Furthermore, the pharmaceutical function of a therapeutic protein may be impaired if amino acid side chains in the vicinity of its biochemical active site become chemically modified. Also, PEG is prone to decomposition by oxidation upon storage while, on the other hand, it is not biodegradable, which can cause severe side effects such as vacuolation of organs upon chronical treatment.

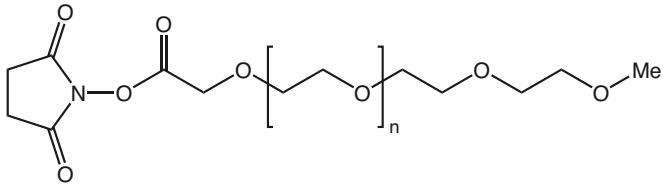
PASylation® provides a beneficial solution to these problems on the basis of a «biological» polymer that is solely composed of natural amino acids and protected by a solid IP position.



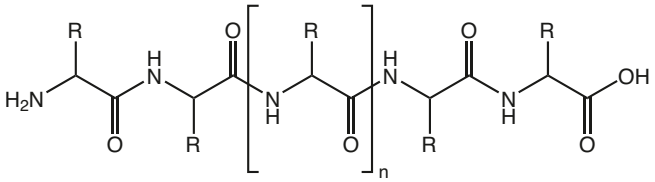




PEG polymer (activated):



PAS biopolymer:



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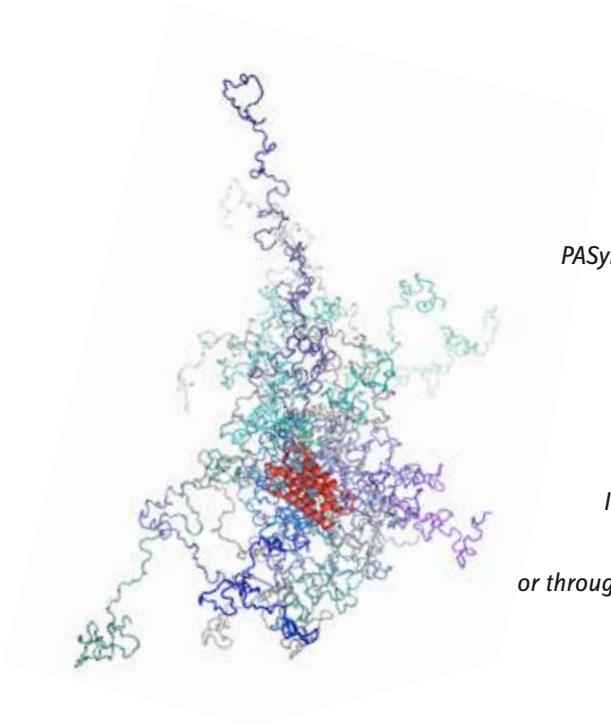
Improving Biopharmaceuticals by PASylation

PASylation® offers several beneficial features, which make this technology attractive for biopharmaceutical drug development:

- PAS sequences adopt a stable random conformation under native buffer conditions and at ambient or body temperature and generate a large hydrodynamic volume, thus increasing the apparent size.
- PASylation® retards renal filtration and, in this way, prolongs plasma half-life of the biological drug by means of a purely biophysical size effect, without any receptor interactions that may influence pharmacodynamics or lead to side effects.
- PAS sequences can be attached via genetic fusion to either the N-terminus, the C-terminus or to both termini of a recombinant protein as well as a spacer between the domains of a bispecific fusion protein.
- PAS sequences can easily be adjusted to pharmacological needs by variation of the polypeptide length.
- PAS sequences are resistant against serum proteases while still being degradable by kidney proteases.
- PAS sequences exhibit high solubility without containing charged side chains.
- PAS sequences do not alter the isoelectric point of the biologically active protein.
- PAS sequences are non-toxic, lack T-cell epitopes, and show no signs of immunogenicity in animal experiments.
- PASylation® avoids the need for additional processing and purification steps due to the simple genetic fusion strategy, which allows biotechnological production and recovery together with the therapeutic protein as one single product following established manufacturing routes.
- Alternatively, PAS polymers are available as pure (monodisperse) biochemical substances, allowing regio-specific chemical conjugation with proteins, peptides and even small molecule drugs by taking advantage of their singular N-terminal free amino group, among other options.



PASylation® is a patented technology.
Licenses are available from:

XL-protein GmbH
Lise-Meitner-Str. 30
D-85354 Freising, Germany
Internet: www.xl-protein.com

XL-protein
Improved Biopharmaceuticals

or through your contact at Iris Biotech GmbH.

	Article No.	Quantity	Price
PAS1000 PAS(201)	PAS1000.0001	1 mg	€ 350,00
Proline-alanine rich sequence (monodisperse polypeptide sequence of 201 amino acid units) MOLECULAR WEIGHT: 16126,89 Da	PAS1000.0005	5 mg	€ 1000,00

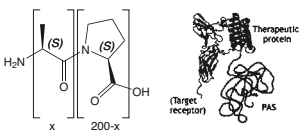


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Table: Characteristics of alternative carriers for polymer therapeutics

Parameter	PAR	PGA	POR	PSR	PEG	PAS	Pentrimeters
Monomer	Arginine	Glutamic acid	Ornithine	Sarcosine	Ethylene glycol	Proline and alanine	two or three ethylene oxide units
Polydispersity	D = 1.1 - 1.2	D = 1.1 - 1.2	D = 1.1 - 1.2	D = 1.1 - 1.2	up to 36 units: D = 1 (monodisperse) larger polymers: D = 1.05 - 1.2 (polydisperse)	strictly monodisperse	monodisperse
Molecular Weight	1 kDa to > 100 kDa	1 kDa to > 100 kDa	1 kDa to > 100 kDa	1 kDa to > 100 kDa	100 Da to 20 kDa	by design	100 Da - 4 kDa
Biocompatibility	biocompatible and biodegradable by lysosomal proteases such as cathepsin B at any molecular weight	biocompatible and biodegradable by lysosomal proteases such as cathepsin B at any molecular weight	biocompatible and biodegradable by lysosomal proteases such as cathepsin B at any molecular weight	biobased, biocompatible and degradable under physiologically relevant conditions at any molecular weight	FDA approved; non-antigenic and non-immunogenic up to 20 kDa; toxicity through accumulation in the liver observed for PEGs with MW > 60 kDa; high doses generate lysosomal storage disease	biocompatible and biodegradable by proteases at any molecular weight	depending on monomer
Application	biopharmaceuticals; special advantage for small molecules; multiple loading can also be used for immunogenic applications	biopharmaceuticals; special advantage for small molecules; multiple loading can also be used for immunogenic applications; application with combination therapy in clinical phase III	biopharmaceuticals; special advantage for small molecules; multiple loading can also be used for immunogenic applications	biopharmaceuticals; special advantage for small molecules; applications published of lactosomes, peptosomes, microcapsules, nanocarriers, imaging, anti-fouling surfaces, cancer treatment	small PEGs show only improvement in solubility; no special polymer therapeutic effect; longer PEGs are very widely used with large molecules and biopharmaceuticals	in particular useful and developed for biopharmaceuticals whose expression system can be modified for PAS co-expression	multiple loading of small molecules; ideal carrier for combination therapy
Conjugation	by chemical synthesis; terminal and side chain conjugation	by chemical synthesis; terminal and side chain conjugation	by chemical synthesis; terminal and side chain conjugation	terminal conjugation by chemical synthesis	terminal conjugation by chemical synthesis	by recombinant synthesis & chemical conjugation	by chemical synthesis
# of conjugation partners	multivalent	multivalent	multivalent	max. bivalent	max. bivalent	monovalent	first generation pentavalent with max. three different conjugates; higher generations multivalent with max. three different conjugates
Chemical Versatility	commercially available with a certain set of different functional groups; other functionalities can easily be designed	commercially available with a large set of different functional groups; other functionalities can easily be designed	commercially available with a certain set of different functional groups; other functionalities can easily be designed	commercially available with a large set of different functional groups; other functionalities can easily be designed	commercially available with a large set of different functional groups; other functionalities can easily be designed	amine and carboxylic reactive; difficult to construct other functionality	commercially available with a large set of different functional groups; other functionalities can easily be designed

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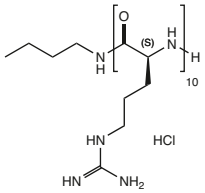
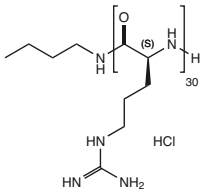
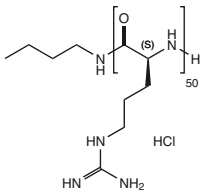
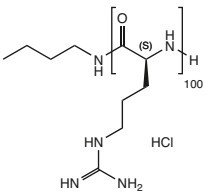
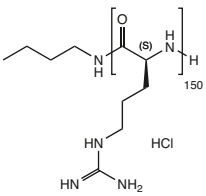
2. Poly(amino acids) – Versatile Carriers for both Large Biopharmaceuticals and Small Drug Molecules

2.1 Polyarginine

		Article No.	Quantity	Price
PAR1000 **nBu-PArg(10)*HCl** n-Butyl-poly-L-Arginine hydrochloride (MW 1900Da) CAS-NO: 26982-20-7 MOLECULAR WEIGHT: 1900 Da		PAR1000.0100	100 mg	€ 150,00
		PAR1000.0500	500 mg	€ 650,00
		PAR1000.1000	1 g	€ 950,00
		PAR1000.5000	5 g	€ 1750,00
		PAR1000.9001	10 g	€ 2600,00
PAR1010 **nBu-PArg(30)*HCl** n-Butyl-poly-L-Arginine hydrochloride (MW 5800Da) CAS-NO: 26982-20-7 MOLECULAR WEIGHT: 5800 Da		PAR1010.0100	100 mg	€ 150,00
		PAR1010.0500	500 mg	€ 650,00
		PAR1010.1000	1 g	€ 950,00
		PAR1010.5000	5 g	€ 1750,00
		PAR1010.9001	10 g	€ 2600,00
PAR1020 **nBu-PArg(50)*HCl** n-Butyl-poly-L-Arginine hydrochloride (MW 9600Da) CAS-NO: 26982-20-7 MOLECULAR WEIGHT: 9600 Da		PAR1020.0100	100 mg	€ 150,00
		PAR1020.0500	500 mg	€ 650,00
		PAR1020.1000	1 g	€ 950,00
		PAR1020.5000	5 g	€ 1750,00
		PAR1020.9001	10 g	€ 2600,00
PAR1030 **nBu-PArg(100)*HCl** n-Butyl-poly-L-Arginine hydrochloride (MW 19000Da) CAS-NO: 26982-20-7 MOLECULAR WEIGHT: 19000 Da		PAR1030.0100	100 mg	€ 150,00
		PAR1030.0500	500 mg	€ 650,00
		PAR1030.1000	1 g	€ 950,00
		PAR1030.5000	5 g	€ 1750,00
		PAR1030.9001	10 g	€ 2600,00
PAR1040 **nBu-PArg(150)*HCl** n-Butyl-poly-L-Arginine hydrochloride (MW 29000Da) CAS-NO: 26982-20-7 MOLECULAR WEIGHT: 29000 Da		PAR1040.0100	100 mg	€ 150,00
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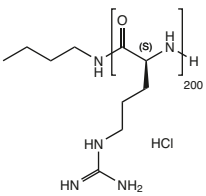
		PAR1040.1000	1 g	€ 950,00
		PAR1040.5000	5 g	€ 1750,00
		PAR1040.9001	10 g	€ 2600,00
PAR1050 **nBu-PArg(200)*HCl** n-Butyl-poly-L-Arginine hydrochloride (MW 38500Da) CAS-NO: 26982-20-7 MOLECULAR WEIGHT: 38500 Da		PAR1050.0100	100 mg	€ 150,00
		PAR1050.0500	500 mg	€ 650,00
		PAR1050.1000	1 g	€ 950,00
		PAR1050.5000	5 g	€ 1750,00
		PAR1050.9001	10 g	€ 2600,00

By controlled living polymerization technology

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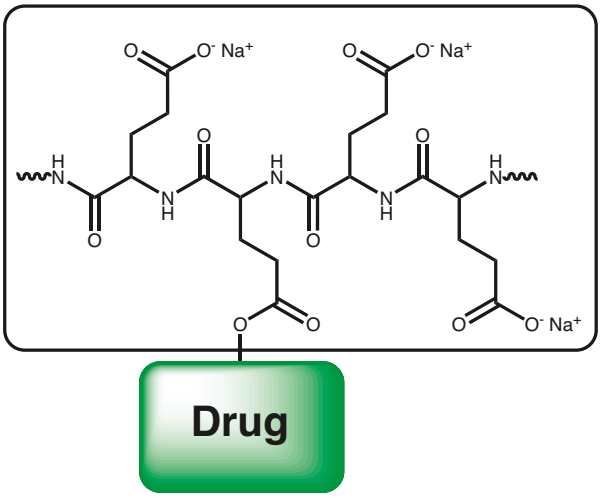
2.2 Poly(glutamic acid)

Polyglutamates are well known to be highly biocompatible, biodegradable and multifunctional polymers, which have already been used as building blocks in polymer drug conjugates and polymeric micelles. Those systems have been utilized for various medical applications ranging from therapy to molecular imaging. Furthermore, a PGA paclitaxel conjugate has already entered clinical studies: Opaxio™ PGA-paclitaxel (PTX) conjugate is currently in



phase III of clinical trials as maintenance therapy in ovarian cancer and has been granted orphan drug designation by the FDA for the treatment of malignant brain cancer. In this context, a synthetic pathway to a plethora of functional polyglutamates (homopolymers, block-co-polymers) with well-defined structure, adjustable molecular weight (MW) and low dispersity ($D = M_w/M_n < 1.2$) applying the ring opening polymerization (ROP) of N-carboxyanhydrides (NCA) are offered. Additionally, as the acid moieties of the polyglutamates can be activated, various functionalities were introduced by "post-polymerization modification" yielding a set of orthogonal reactive side chains. The reactive moieties, such as azides, maleimides, thiols, or alkynes offer the opportunity of specific conjugation of drugs, targeting moieties or markers.

Besides introducing reactive groups, the functionalization strategy has also been used for PEGylation of PGA. This modification could reduce charge induced interactions and therefore change pharmacological properties such as blood circulation.

In summary, a tool kit of various polyglutamates is offered enabling the synthesis of a variety of polymer drug conjugates or polymer based imaging agents. The functional polymeric precursors allow functionalizing and therefore adjusting the polymer properties to many desired applications.

Background information:

An ideal polymer to be used as carrier for drug delivery or molecular imaging should be characterized by

1. biodegradability or adequate molecular weight that allows elimination from the body to avoid progressive accumulation in vivo.
2. low polydispersity to ensure an acceptable homogeneity of the final system allowing to adjust pharmacokinetics.
3. long body residence time either to prolong the conjugate action or to allow distribution and accumulation in the desired body compartments (therefore high molecular weight is desired).
4. availability of many reactive groups especially for small drug conjugation in order to achieve a satisfactory drug loading or to allow polymer-based combination therapy (multivalent polymers).

Most polymer conjugates in the market and in the clinics use N-(2-hydroxypropyl)methacrylamide (HPMA) co-polymers, PEG or more recently polyglutamic acid (PGA) as carriers. Biopersistent carriers (PEG, HPMA) present disadvantages, if chronical parenteral administration and/or high doses are required as there is the potential to generate 'lysosomal storage disease' syndrome. Alternatively, polyglutamates are well known to be highly biocompatible, biodegradable (by thiol protease cathepsin B) and multifunctional polymers, which have been already applied to various applications that range from drug delivery systems, tissue engineering, sensing, and catalysis. PGA is considered a promising material for the design of novel nanomedicine due to its high biocompatibility, multivalency and in vivo degradability. As a prominent example for its use as nanopharmaceutical, one has to mention a conjugate of polyglutamic acid (PGA) and paclitaxel (Opaxio™, formerly Xyotax, PPX, CT-2103) in phase III of clinical trials. Another clinical example is provided by several polymeric micelles – firstly developed by Kataoka – that were designed based on the block-copolymer PEG-PGA, namely NK 105, NK-6004, Nanoplatin or NC-4016 in Phase I-III trials. Other recent examples of the use of this multifunctional, biodegradable polyanionic carrier can be found in many drug delivery applications not only in cancer, but also in other diseases including tissue regeneration. PGA has also been used due to its multivalency in the development of polymer-based combination therapy applications.

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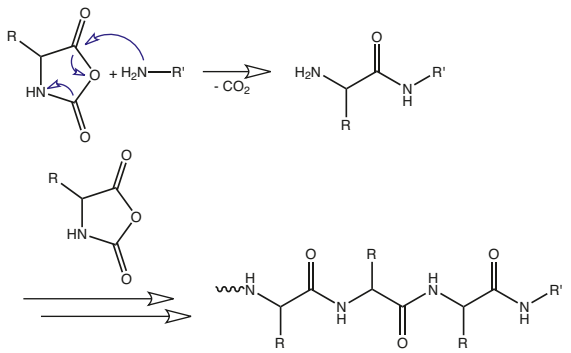
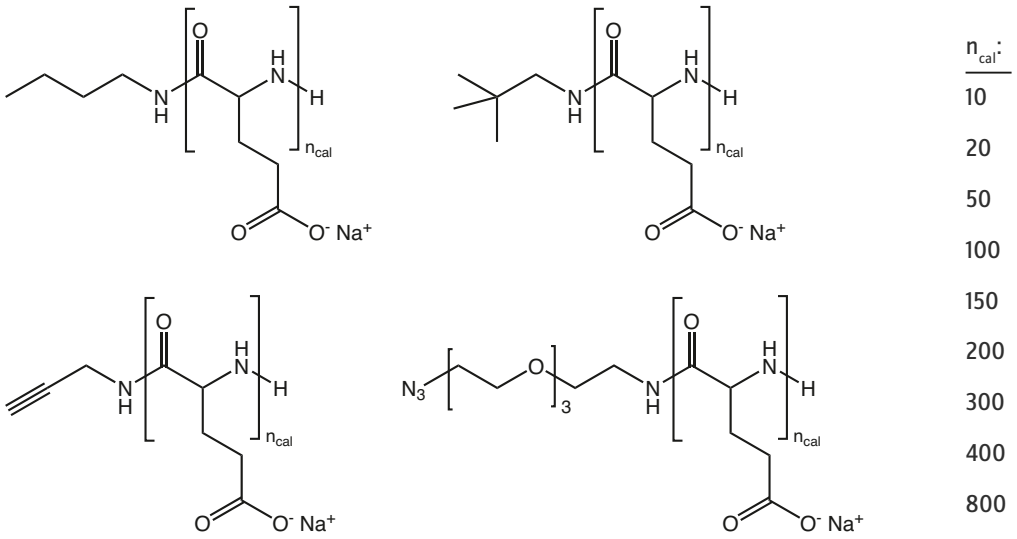


Polyglutamates are commonly obtained by ring-opening polymerization (ROP) of amino acid-N-carboxyanhydrides (NCA). The polymerization method enables access to polypeptidic architectures which are beyond nature's possibilities. Due to the variety of natural and non-natural amino acids and the versatility of the polymerization method, a plethora of polypeptides has been created and characterized, as reviewed in literature. So far, the most promising chemical approaches are based on initiation of purified NCAs with primary amines, amine hydrochloride salts, heavy metal catalysts or hexamethyldisilazanes. All those methods have certain limitations in the synthesis of well defined polypeptides of high and reproducable quality. The commercial offer so far of PGA was very limited.

In order to overcome these limitations, a controlled and living polymerization methodology has been developed based on the modification of the initiators for the ROP of NCAs to produce polypeptides and polypeptide-based block copolymers on a multigram scale. With this controlled NCA methodology we managed to enhance the degree of polymerization (DP), structural versatility and decrease polydispersity index (D) of polypeptides obtained by NCA polymerization. The method employed effectively suppressed side reactions. Therefore, the control over polymer end groups has been also enhanced enabling the synthesis of well-defined homo or diblock polypeptides of a variety of molecular weight and side-chain and terminal chain functionalities.



# of Monomers n	10	20	50	100	150	200	300	400	800
MW (Da)	1.500	3.000	7.500	15.000	22.000	30.000	45.000	60.000	120.000
Polydispersity D	1.1-1.2	1.1-1.2	1.1-1.2	1.1-1.2	1.1-1.2	1.1-1.2	1.1-1.2	1.1-1.2	1.1-1.2

PGA - A Modern Versatile Polymer as Drug Carrier for Drug Delivery, Tissue Engineering, Sensing, Catalysis, NanoMedicine

Poly(glutamic acid) is a biocompatible and biodegradable polymer which can be conjugated through side chain condensation with any suitable molecule. Due to a controlled proprietary and patented process with living polymerization technology a superior quality of PGA is achieved. Usual poly amino acids carry significant amounts of cyclic structures, carbamates or isocyanates. Through a very well controlled polymerization process, well defined terminal groups and polymeric structures are achieved in high purity and with superior polydispersity. Through "living polymer" technology also multifunctional PGA polymers can be produced through post polymerization modification. PGA can be used for polymer therapeutics application for large biopharmaceuticals and also for small molecule drugs. A controlled loading of small molecules onto PGA polymer can be achieved and brings the advantage of polymer therapy also to small molecules.

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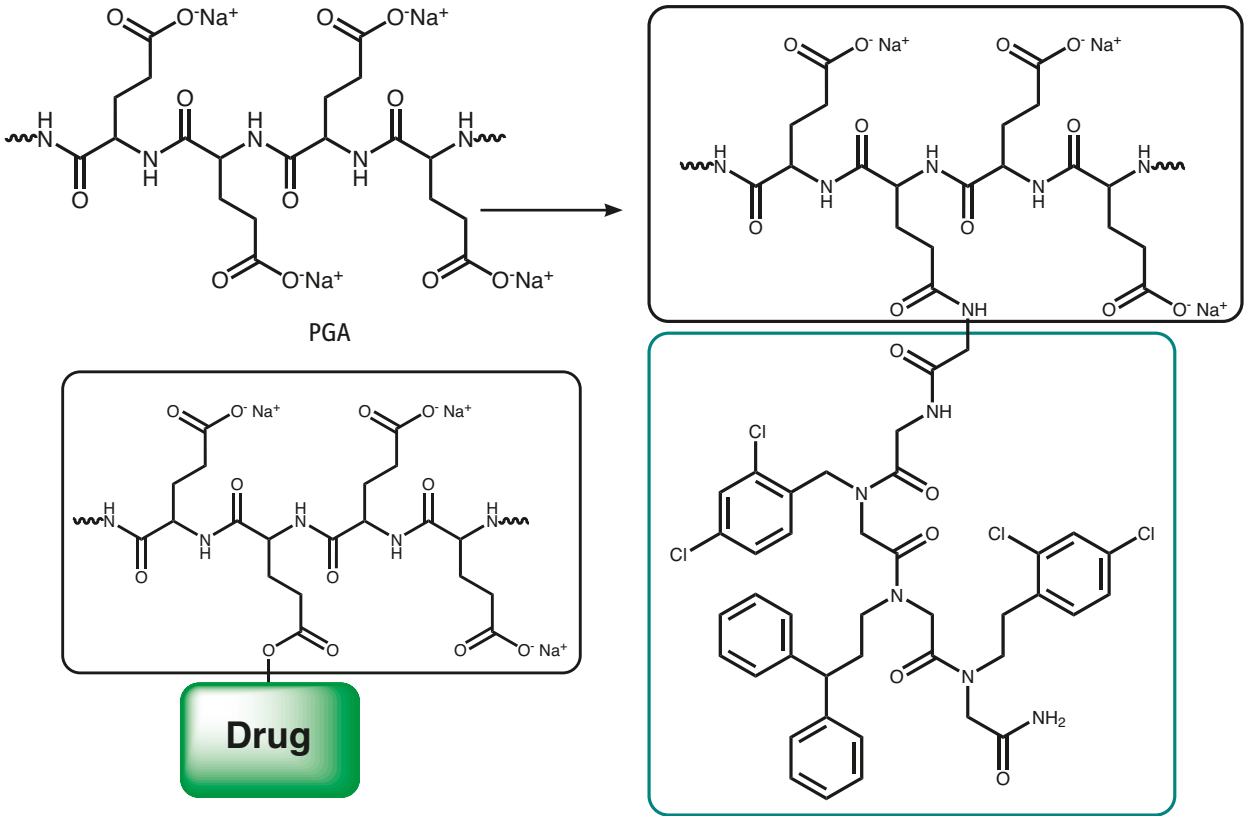
Published Applications:

In the following published application, PGA equips a hydrophobic small peptoidic drug molecule which has poor water solubility with superior pharmacokinetic properties, excellent water solubility, and increased membrane permeability.

Reference:

- Modulation of Cellular Apoptosis with Apoptotic Protease-Activating Factor 1 (Apaf-1) Inhibitors; L. Mondragón, M. Orzáez, G. Sanclimens, A. Moure, A. Armiñán, P. Sepúlveda, A. Messeguer, M. J. Vicent and E. Pérez-Payá; *J Med Chem* 2008; **51**: 521-529. doi:10.1021/jm701195j



PGA

PGA - Peptoid Conjugate

Drug Carrier and Release System for Multiple Drug Therapy

Through post polymerization modification, PGA can be equipped with additional functional groups, like alkyne or azides for click conjugation; however, also the base polymer can be loaded with different molecules as shown in the following example.

Paclitaxel (PTX) is a widely-used potent cytotoxic drug that also exhibits anti-angiogenic effects at low doses. Its use at its full potential is limited by severe side effects. The PGA polymer PTX nano-scaled conjugate passively targets tumor tissue exploiting enhanced permeability and retention effect. The polymer is enzymatically-degradable, leading to PTX release under lysosomal acidic pH. The cyclic RGD peptide enhances the effect of PGA-PTX alone by targeting $\alpha_v\beta_3$ integrin, which is overexpressed on tumor endothelial and epithel cells.

Reference:

- Integrin-assisted drug delivery of nano-scaled polymer therapeutics bearing paclitaxel; A. Eldar-Boock, K. Miller, J. Sanchis, R. Lupu, M. J. Vicent and R. Satchi-Fainaro; *Biomaterials* 2011; **32**: 3862-3874. doi:10.1016/j.biomaterials.2011.01.073

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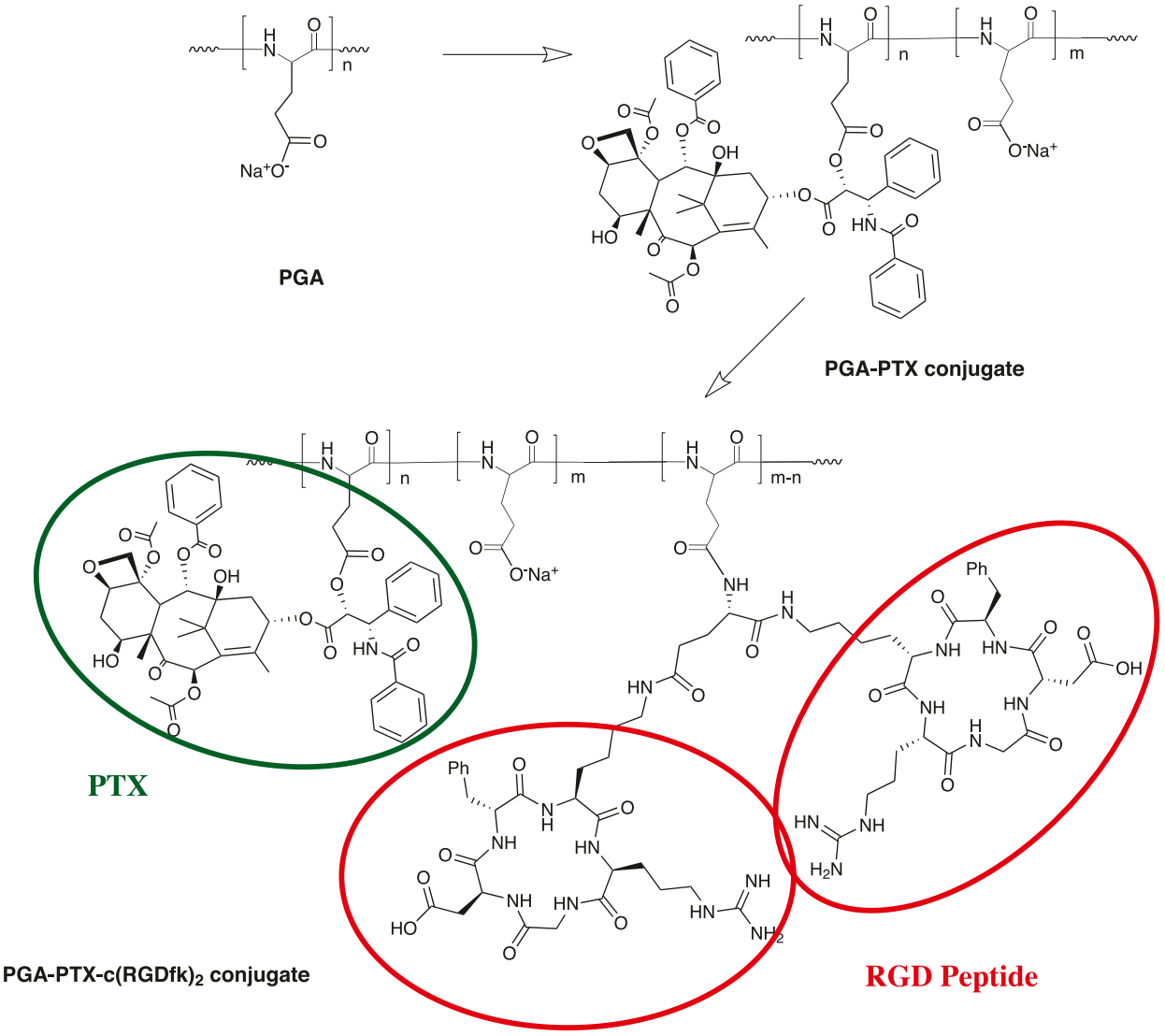

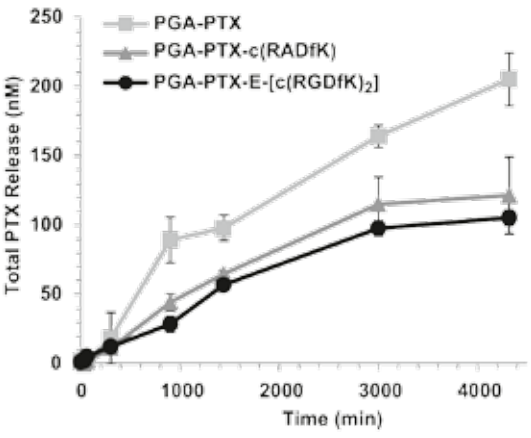

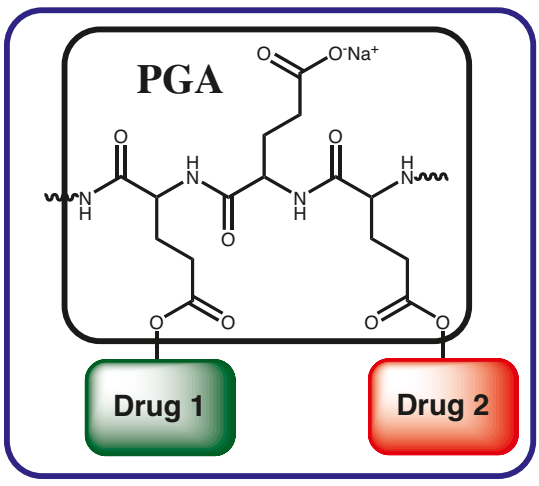

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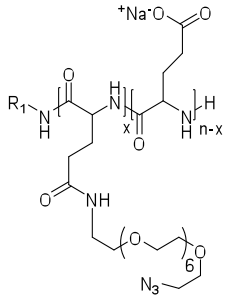
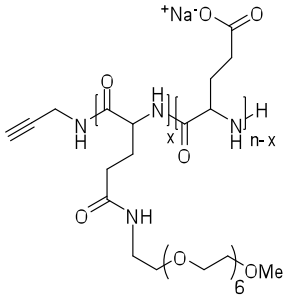
Bi-functional PGA Drug Carrier available for Sophisticated Applications: Combination Therapy – Personalized Medicine

PGA provides ideal possibilities for multi-drug therapies. Already the base PGA polymer can be utilized for these purposes, while multifunctional derivatives increase the number of options for the medicinal chemist.



Azido: Conjugation via Click Chemistry
Glu: Conjugation via Carbonyl Condensation



Propargyl: Conjugation via Click Chemistry
Glu: Conjugation via Carbonyl Condensation

References:

- Polymer-doxycycline conjugates as fibril disrupters: An approach towards the treatment of a rare amyloidotic disease; I. Conejos-Sánchez, I. Cardoso, M. Oteo-Vives, E. Romero-Sanz, A. Paul, A. R. Sauri, M. A. Morcillo, M. J. Saraiva and M. J. Vicent; *J Control Release* 2015; **198**: 80-90. doi:10.1016/j.jconrel.2014.12.003
- Reduction Sensitive Poly(l-glutamic acid) (PGA)-Protein Conjugates Designed for Polymer Masked-Unmasked Protein Therapy; M. Talelli and M. J. Vicent; *Biomacromolecules* 2014; **15**: 4168-4177. doi:10.1021/bm5011883
- Overcoming the PEG-addiction: well-defined alternatives to PEG, from structure-property relationships to better defined therapeutics; M. Barz, R. Luxenhofer, R. Zentel and M. J. Vicent; *Polymer Chemistry* 2011; **2**: 1900-1918. doi:10.1039/c0py00406e
- Modulation of Cellular Apoptosis with Apoptotic Protease-Activating Factor 1 (Apaf-1) Inhibitors; L. Mondragón, M. Orzáez, G. Sanclimens, A. Moure, A. Armiñán, P. Sepúlveda, A. Messeguer, M. J. Vicent and E. Pérez-Payá; *J Med Chem* 2008; **51**: 521-529. doi:10.1021/jm701195j
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2.2.1 Base Polymers

		Article No.	Quantity	Price
PGA1005 **nBu-PGA(20)**	n-Butyl-poly(L-glutamic acid) sodium salt (MW 3000Da) CAS-NO: 26247-79-0 MOLECULAR WEIGHT: 3000 Da	PGA1005.0100	100 mg	€ 145,00
		PGA1005.0500	500 mg	€ 260,00
		PGA1005.1000	1 g	€ 375,00
		PGA1005.5000	5 g	€ 1700,00
		PGA1005.9001	10 g	€ 2950,00
PGA1010 **nBu-PGA(50)**	n-Butyl-poly(L-glutamic acid) sodium salt (MW 7600Da) CAS-NO: 26247-79-0 MOLECULAR WEIGHT: 7600 Da	PGA1010.0100	100 mg	€ 145,00
		PGA1010.0500	500 mg	€ 260,00
		PGA1010.1000	1 g	€ 375,00
		PGA1010.5000	5 g	€ 1700,00
		PGA1010.9001	10 g	€ 2950,00
PGA1015 **nBu-PGA(100)**	n-Butyl-poly(L-glutamic acid) sodium salt (MW 15000Da) CAS-NO: 26247-79-0 MOLECULAR WEIGHT: 15100 Da	PGA1015.0100	100 mg	€ 145,00
		PGA1015.0500	500 mg	€ 260,00
		PGA1015.0001	1 g	€ 375,00
		PGA1015.0005	5 g	€ 1700,00
		PGA1015.0010	10 g	€ 2950,00
PGA1017 **nBu-PGA(150)**	n-Butyl-poly(L-glutamic acid) sodium salt (MW 22700Da) CAS-NO: 26247-79-0 MOLECULAR WEIGHT: 22700 Da	PGA1017.0100	100 mg	€ 145,00
		PGA1017.0500	500 mg	€ 260,00
		PGA1017.1000	1 g	€ 375,00
		PGA1017.5000	5 g	€ 1700,00
		PGA1017.9001	10 g	€ 2950,00
PGA1020 **nBu-PGA(200)**	n-Butyl-poly(L-glutamic acid) sodium salt (MW 30200Da) CAS-NO: 26247-79-0 MOLECULAR WEIGHT: 30200 Da	PGA1020.0100	100 mg	€ 145,00
		PGA1020.0500	500 mg	€ 260,00
		PGA1020.1000	1 g	€ 375,00
		PGA1020.5000	5 g	€ 1700,00
		PGA1020.9001	10 g	€ 2950,00
PGA1025 **nBu-PGA(300)**	n-Butyl-poly(L-glutamic acid) sodium salt (MW 45300Da) CAS-NO: 26247-79-0 MOLECULAR WEIGHT: 45300 Da	PGA1025.0100	100 mg	€ 145,00
		PGA1025.0500	500 mg	€ 260,00
		PGA1025.1000	1 g	€ 375,00
		PGA1025.5000	5 g	€ 1700,00
		PGA1025.9001	10 g	€ 2950,00

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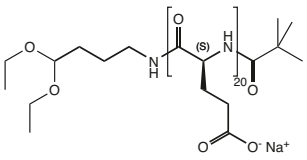
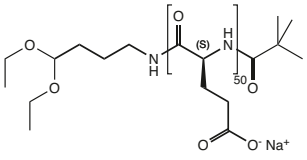
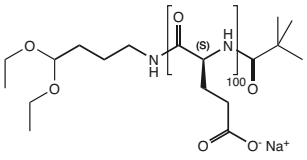
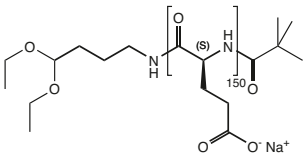
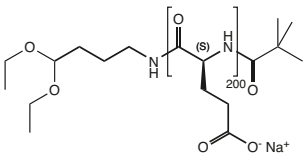
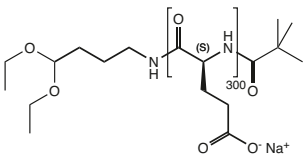
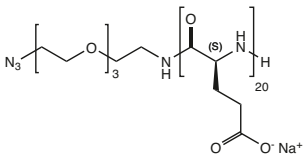
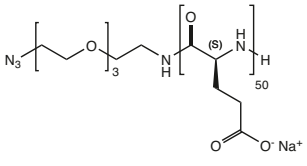
		Article No.	Quantity	Price
PGA1700	**Aldehyde-PGA(20)tBu**	PGA1700.0100	100 mg	€ 145,00
(4,4-Diethoxybutyl)-poly(sodium L-glutamato) pivalate (MW 3000Da)		PGA1700.0500	500 mg	€ 275,00
MOLECULAR WEIGHT: 3000 Da		PGA1700.1000	1 g	€ 450,00
		PGA1700.5000	5 g	€ 1850,00
		PGA1700.9001	10 g	€ 3200,00
PGA1710	**Aldehyde-PGA(50)tBu**	PGA1710.0100	100 mg	€ 145,00
(4,4-Diethoxybutyl)-poly(sodium L-glutamato) pivalate (MW 7600Da)		PGA1710.0500	500 mg	€ 275,00
MOLECULAR WEIGHT: 7600 Da		PGA1710.1000	1 g	€ 450,00
		PGA1710.5000	5 g	€ 1850,00
		PGA1710.9001	10 g	€ 3200,00
PGA1720	**Aldehyde-PGA(100)tBu**	PGA1720.0100	100 mg	€ 145,00
(4,4-Diethoxybutyl)-poly(sodium L-glutamato) pivalate (MW 15100Da)		PGA1720.0500	500 mg	€ 275,00
MOLECULAR WEIGHT: 15100 Da		PGA1720.1000	1 g	€ 450,00
		PGA1720.5000	5 g	€ 1850,00
		PGA1720.9001	10 g	€ 3200,00
PGA1730	**Aldehyde-PGA(150)tBu**	PGA1730.0100	100 mg	€ 145,00
(4,4-Diethoxybutyl)-poly(sodium L-glutamato) pivalate (MW 22700Da)		PGA1730.0500	500 mg	€ 275,00
MOLECULAR WEIGHT: 22700 Da		PGA1730.1000	1 g	€ 450,00
		PGA1730.5000	5 g	€ 1850,00
		PGA1730.9001	10 g	€ 3200,00
PGA1740	**Aldehyde-PGA(200)tBu**	PGA1740.0100	100 mg	€ 145,00
(4,4-Diethoxybutyl)-poly(sodium L-glutamato) pivalate (MW 30200Da)		PGA1740.0500	500 mg	€ 275,00
MOLECULAR WEIGHT: 30200 Da		PGA1740.1000	1 g	€ 450,00
		PGA1740.5000	5 g	€ 1850,00
		PGA1740.9001	10 g	€ 3200,00
PGA1750	**Aldehyde-PGA(300)tBu**	PGA1750.0100	100 mg	€ 145,00
(4,4-Diethoxybutyl)-poly(sodium L-glutamato) pivalate (MW 45300Da)		PGA1750.0500	500 mg	€ 275,00
MOLECULAR WEIGHT: 45300 Da		PGA1750.1000	1 g	€ 450,00
		PGA1750.5000	5 g	€ 1850,00
		PGA1750.9001	10 g	€ 3200,00
PGA1125	**N_3-PGA(20)**	PGA1125.0100	100 mg	€ 145,00
Azido-ethyltri(ethylene glycol)-poly(L-glutamic acid) sodium salt (MW 3000Da)		PGA1125.0500	500 mg	€ 280,00
MOLECULAR WEIGHT: 3000 Da		PGA1125.1000	1 g	€ 500,00
		PGA1125.5000	5 g	€ 2100,00
PGA1130	**N_3-PGA(50)**	PGA1130.0100	100 mg	€ 145,00
Azido-ethyltri(ethylene glycol)-poly(L-glutamic acid) sodium salt (MW 7500Da)		PGA1130.0500	500 mg	€ 280,00
MOLECULAR WEIGHT: 7500 Da		PGA1130.1000	1 g	€ 500,00
		PGA1130.5000	5 g	€ 2100,00

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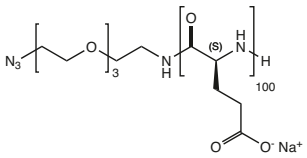
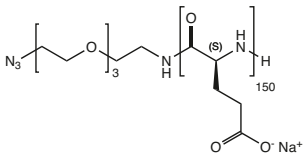
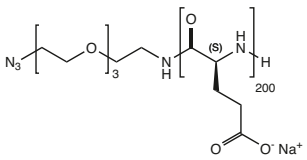
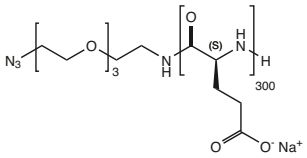
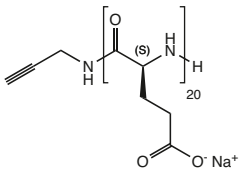
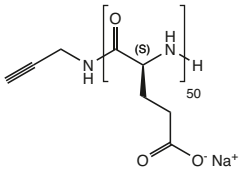
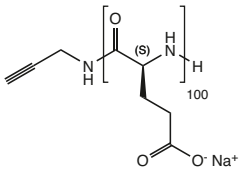
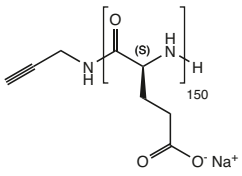
		Article No.	Quantity	Price
PGA1135	**N_3-PGA(100)**	PGA1135.0100	100 mg	€ 145,00
Azido-ethyltri(ethylene glycol)-poly(L-glutamic acid) sodium salt (MW 15000Da)		PGA1135.0500	500 mg	€ 280,00
MOLECULAR WEIGHT: 15000 Da		PGA1135.0001	1 g	€ 500,00
		PGA1135.0005	5 g	€ 2100,00
PGA1137	**N_3-PGA(150)**	PGA1137.0100	100 mg	€ 145,00
Azido-ethyltri(ethylene glycol)-poly(L-glutamic acid) sodium salt (MW 22700Da)		PGA1137.0500	500 mg	€ 280,00
MOLECULAR WEIGHT: 22700 Da		PGA1137.1000	1 g	€ 500,00
		PGA1137.5000	5 g	€ 2100,00
PGA1140	**N_3-PGA(200)**	PGA1140.0100	100 mg	€ 145,00
Azido-ethyltri(ethylene glycol)-poly(L-glutamic acid) sodium salt (MW 30000Da)		PGA1140.0500	500 mg	€ 280,00
MOLECULAR WEIGHT: 30000 Da		PGA1140.1000	1 g	€ 500,00
		PGA1140.5000	5 g	€ 2100,00
PGA1145	**N_3-PGA(300)**	PGA1145.0100	100 mg	€ 145,00
Azido-ethyltri(ethylene glycol)-poly(L-glutamic acid) sodium salt (MW 45000Da)		PGA1145.0500	500 mg	€ 280,00
MOLECULAR WEIGHT: 45000 Da		PGA1145.1000	1 g	€ 500,00
		PGA1145.5000	5 g	€ 2100,00
PGA1085	**Prg-PGA(20)**	PGA1085.0100	100 mg	€ 145,00
Propargyl-poly(L-glutamic acid) sodium salt (MW 3000Da)		PGA1085.0500	500 mg	€ 260,00
MOLECULAR WEIGHT: 3000 Da		PGA1085.1000	1 g	€ 450,00
		PGA1085.5000	5 g	€ 1850,00
		PGA1085.9001	10 g	€ 3200,00
PGA1090	**Prg-PGA(50)**	PGA1090.0100	100 mg	€ 145,00
Propargyl-poly(L-glutamic acid) sodium salt (MW 7500Da)		PGA1090.0500	500 mg	€ 260,00
MOLECULAR WEIGHT: 7500 Da		PGA1090.1000	1 g	€ 450,00
		PGA1090.5000	5 g	€ 1850,00
		PGA1090.9001	10 g	€ 3200,00
PGA1095	**Prg-PGA(100)**	PGA1095.0100	100 mg	€ 145,00
Propargyl-poly(L-glutamic acid) sodium salt (MW 15100Da)		PGA1095.0500	500 mg	€ 260,00
MOLECULAR WEIGHT: 15100 Da		PGA1095.0001	1 g	€ 450,00
		PGA1095.0005	5 g	€ 1850,00
		PGA1095.0010	10 g	€ 3200,00
PGA1097	**Prg-PGA(150)**	PGA1097.0100	100 mg	€ 145,00
Propargyl-poly(L-glutamic acid) sodium salt (MW 22700Da)		PGA1097.0500	500 mg	€ 260,00
MOLECULAR WEIGHT: 22700 Da		PGA1097.1000	1 g	€ 450,00
		PGA1097.5000	5 g	€ 1850,00
		PGA1097.9001	10 g	€ 3200,00

Inquire for any different terminal group or molecular weight.

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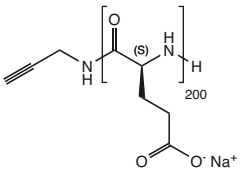
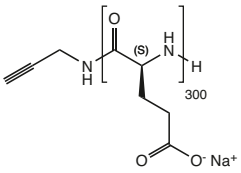
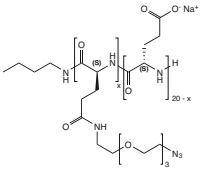
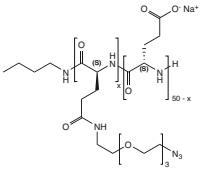
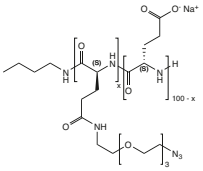
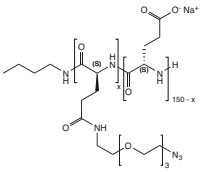
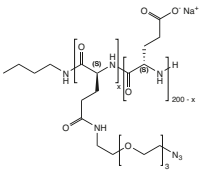
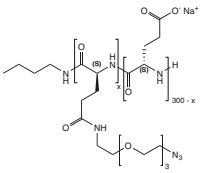
		Article No.	Quantity	Price
PGA1100 **Prg-PGA(200)** Propargyl-poly(L-glutamic acid) sodium salt (MW 30200Da) MOLECULAR WEIGHT: 30200 Da		PGA1100.0100	100 mg	€ 145,00
		PGA1100.0500	500 mg	€ 260,00
		PGA1100.1000	1 g	€ 450,00
		PGA1100.5000	5 g	€ 1850,00
		PGA1100.9001	10 g	€ 3200,00
PGA1105 **Prg-PGA(300)** Propargyl-poly(L-glutamic acid) sodium salt (MW 45300Da) MOLECULAR WEIGHT: 45300 Da		PGA1105.0100	100 mg	€ 145,00
		PGA1105.0500	500 mg	€ 260,00
		PGA1105.1000	1 g	€ 450,00
		PGA1105.5000	5 g	€ 1850,00
		PGA1105.9001	10 g	€ 3200,00

2.2.2 Copolymers

PGA1265 **nBu-PGA(20)[PEG2-N_3(10)]** n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (5-10 mol% azido substitution, MW 3300Da) MOLECULAR WEIGHT: 3300 Da		PGA1265.0100	100 mg	€ 375,00
		PGA1265.0500	500 mg	€ 750,00
		PGA1265.1000	1 g	€ 1275,00
PGA1270 **nBu-PGA(50)[PEG2-N_3(10)]** n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (5-10 mol% azido substitution, MW 8300Da) MOLECULAR WEIGHT: 8300 Da		PGA1270.0100	100 mg	€ 375,00
		PGA1270.0500	500 mg	€ 750,00
		PGA1270.1000	1 g	€ 1275,00
PGA1275 **nBu-PGA(100)[PEG2-N_3(10)]** n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (5-10 mol% azido substitution, MW 16700Da) MOLECULAR WEIGHT: 16700 Da		PGA1275.0100	100 mg	€ 375,00
		PGA1275.0500	500 mg	€ 750,00
		PGA1275.1000	1 g	€ 1275,00
PGA1277 **nBu-PGA(150)[PEG2-N_3(10)]** n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (5-10 mol% azido substitution, MW 23000Da) MOLECULAR WEIGHT: 23000 Da		PGA1277.0100	100 mg	€ 375,00
		PGA1277.0500	500 mg	€ 750,00
		PGA1277.1000	1 g	€ 1275,00
PGA1280 **nBu-PGA(200)[PEG2-N_3(10)]** n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (5-10 mol% azido substitution, MW 33400Da) MOLECULAR WEIGHT: 33400 Da		PGA1280.0100	100 mg	€ 375,00
		PGA1280.0500	500 mg	€ 750,00
		PGA1280.1000	1 g	€ 1275,00
PGA1282 **nBu-PGA(300)[PEG2-N_3(10)]** n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (5-10 mol% azido substitution, MW 45900Da) MOLECULAR WEIGHT: 45900 Da		PGA1282.0100	100 mg	€ 375,00
		PGA1282.0500	500 mg	€ 750,00
		PGA1282.1000	1 g	€ 1275,00

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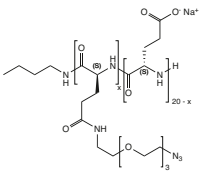
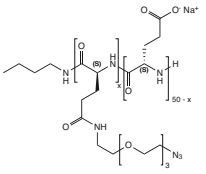
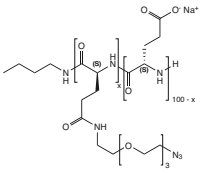
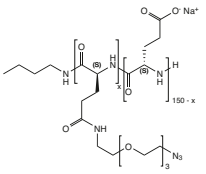
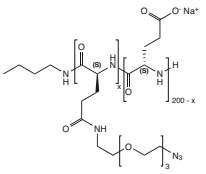
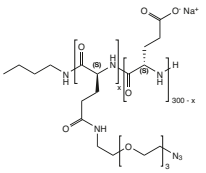
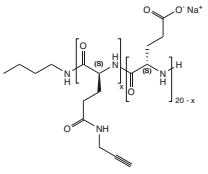
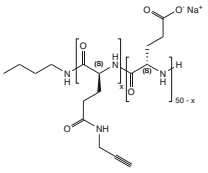
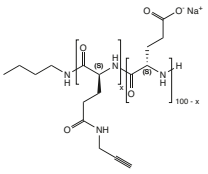
		Article No.	Quantity	Price
PGA1290 nBu-PGA(20)[PEG2-N_3(20)] n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (10-20 mol% azido substitution, MW 3600Da) MOLECULAR WEIGHT: 3600 Da		PGA1290.0100 PGA1290.0500 PGA1290.1000	100 mg 500 mg 1 g	€ 525,00 € 975,00 € 1450,00
PGA1295 nBu-PGA(50)[PEG2-N_3(20)] n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (10-20 mol% azido substitution, MW 9100Da) MOLECULAR WEIGHT: 9100 Da		PGA1295.0100 PGA1295.0500 PGA1295.1000	100 mg 500 mg 1 g	€ 525,00 € 975,00 € 1450,00
PGA1300 nBu-PGA(100)[PEG2-N_3(20)] n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (10-20 mol% azido substitution, MW 18300Da) MOLECULAR WEIGHT: 18300 Da		PGA1300.0100 PGA1300.0500 PGA1300.1000	100 mg 500 mg 1 g	€ 525,00 € 975,00 € 1450,00
PGA1302 nBu-PGA(150)[PEG2-N_3(20)] n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (10-20 mol% azido substitution, MW 24800Da) MOLECULAR WEIGHT: 24800 Da		PGA1302.0100 PGA1302.0500 PGA1302.1000	100 mg 500 mg 1 g	€ 525,00 € 975,00 € 1450,00
PGA1305 nBu-PGA(200)[PEG2-N_3(20)] n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (10-20 mol% azido substitution, MW 36700Da) MOLECULAR WEIGHT: 36700 Da		PGA1305.0100 PGA1305.0500 PGA1305.1000	100 mg 500 mg 1 g	€ 525,00 € 975,00 € 1450,00
PGA1307 nBu-PGA(300)[PEG2-N_3(20)] n-Butyl-poly(L-glutamic acid gamma-azido-ethyltri(ethylene glycol) amide) sodium salt (10-20 mol% azido substitution, MW 49700Da) MOLECULAR WEIGHT: 49700 Da		PGA1307.0100 PGA1307.0500 PGA1307.1000	100 mg 500 mg 1 g	€ 525,00 € 975,00 € 1450,00
PGA1165 nBu-PGA(20)[Prg(10)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (5-10 mol% propargyl substitution, MW 3000Da) MOLECULAR WEIGHT: 3000 Da		PGA1165.0100 PGA1165.0500 PGA1165.1000 PGA1165.5000	100 mg 500 mg 1 g 5 g	€ 275,00 € 675,00 € 925,00 € 3200,00
PGA1170 nBu-PGA(50)[Prg(10)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (5-10 mol% propargyl substitution, MW 7500Da) MOLECULAR WEIGHT: 7500 Da		PGA1170.0100 PGA1170.0500 PGA1170.1000 PGA1170.5000	100 mg 500 mg 1 g 5 g	€ 275,00 € 675,00 € 925,00 € 3200,00
PGA1175 nBu-PGA(100)[Prg(10)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (5-10 mol% propargyl substitution, MW 15000Da) MOLECULAR WEIGHT: 15000 Da		PGA1175.0100 PGA1175.0500 PGA1175.1000 PGA1175.5000	100 mg 500 mg 1 g 5 g	€ 275,00 € 675,00 € 925,00 € 3200,00

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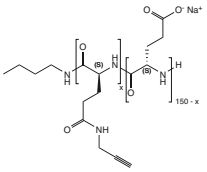
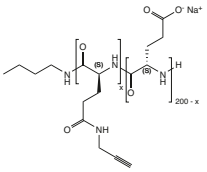
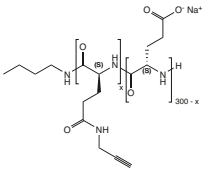
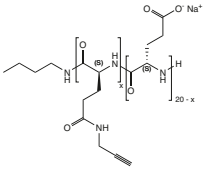
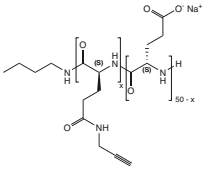
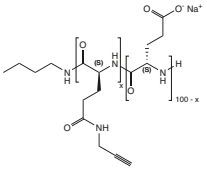
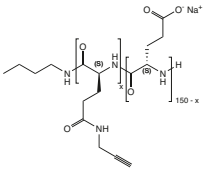
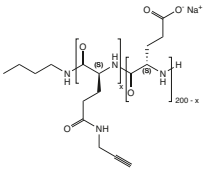
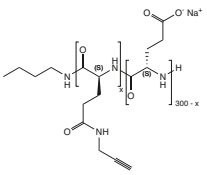
		Article No.	Quantity	Price
PGA1177 nBu-PGA(150)[Prg(10)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (5-10 mol% propargyl substitution, MW 23000Da) MOLECULAR WEIGHT: 23000 Da		PGA1177.0100	100 mg	€ 275,00
		PGA1177.0500	500 mg	€ 675,00
		PGA1177.1000	1 g	€ 925,00
		PGA1177.5000	5 g	€ 3200,00
PGA1180 nBu-PGA(200)[Prg(10)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (5-10 mol% propargyl substitution, MW 30000Da) MOLECULAR WEIGHT: 30000 Da		PGA1180.0100	100 mg	€ 275,00
		PGA1180.0500	500 mg	€ 675,00
		PGA1180.1000	1 g	€ 925,00
		PGA1180.5000	5 g	€ 3200,00
PGA1182 nBu-PGA(300)[Prg(10)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (5-10 mol% propargyl substitution, MW 45900Da) MOLECULAR WEIGHT: 45900 Da		PGA1182.0100	100 mg	€ 275,00
		PGA1182.0500	500 mg	€ 675,00
		PGA1182.1000	1 g	€ 925,00
		PGA1182.5000	5 g	€ 3200,00
PGA1190 nBu-PGA(20)[Prg(20)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (10-20 mol% propargyl substitution, MW 3000Da) MOLECULAR WEIGHT: 3000 Da		PGA1190.0100	100 mg	€ 325,00
		PGA1190.0500	500 mg	€ 775,00
		PGA1190.1000	1 g	€ 1100,00
		PGA1190.5000	5 g	€ 3200,00
PGA1195 nBu-PGA(50)[Prg(20)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (10-20 mol% propargyl substitution, MW 7500Da) MOLECULAR WEIGHT: 7500 Da		PGA1195.0100	100 mg	€ 325,00
		PGA1195.0500	500 mg	€ 775,00
		PGA1195.1000	1 g	€ 1100,00
		PGA1195.5000	5 g	€ 3200,00
PGA1200 nBu-PGA(100)[Prg(20)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (10-20 mol% propargyl substitution, MW 15000Da) MOLECULAR WEIGHT: 15000 Da		PGA1200.0100	100 mg	€ 325,00
		PGA1200.0500	500 mg	€ 775,00
		PGA1200.1000	1 g	€ 1100,00
		PGA1200.5000	5 g	€ 3200,00
PGA1202 nBu-PGA(150)[Prg(20)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (10-20 mol% propargyl substitution, MW 24800Da) MOLECULAR WEIGHT: 24800 Da		PGA1202.0100	100 mg	€ 325,00
		PGA1202.0500	500 mg	€ 775,00
		PGA1202.1000	1 g	€ 1100,00
		PGA1202.5000	5 g	€ 3200,00
PGA1205 nBu-PGA(200)[Prg(20)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (10-20 mol% propargyl substitution, MW 30000Da) MOLECULAR WEIGHT: 30000 Da		PGA1205.0100	100 mg	€ 325,00
		PGA1205.0500	500 mg	€ 775,00
		PGA1205.1000	1 g	€ 1100,00
		PGA1205.5000	5 g	€ 3200,00
PGA1207 nBu-PGA(300)[Prg(20)] n-Butyl-poly(L-glutamic acid gamma-propargyl amide) sodium salt (10-20 mol% propargyl substitution, MW 49700Da) MOLECULAR WEIGHT: 49700 Da		PGA1207.0100	100 mg	€ 325,00
		PGA1207.0500	500 mg	€ 775,00
		PGA1207.1000	1 g	€ 1100,00
		PGA1207.5000	5 g	€ 3200,00

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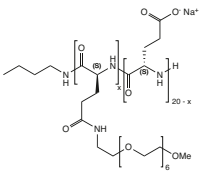
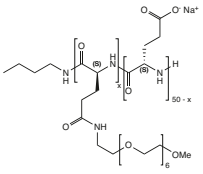
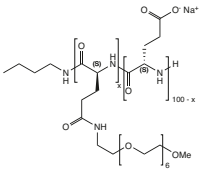
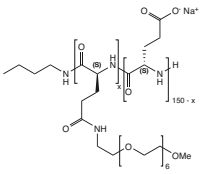
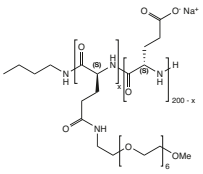
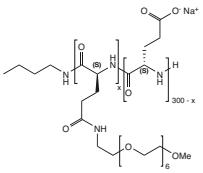
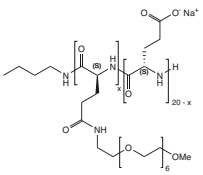
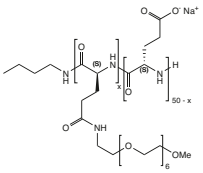
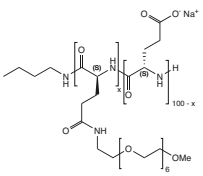
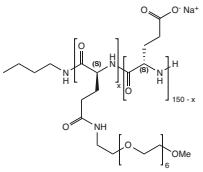
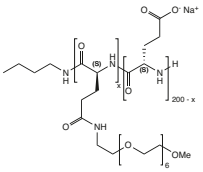
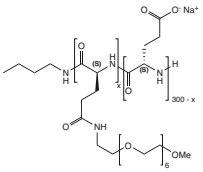
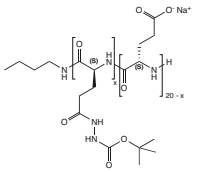
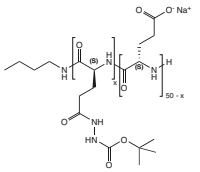
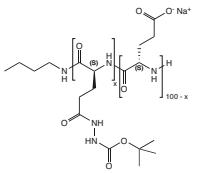
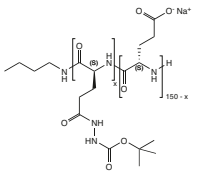
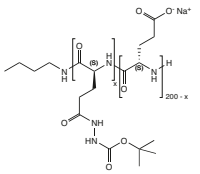
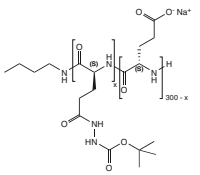
		Article No.	Quantity	Price
PGA1465 nBu-PGA(20)[mPEG(10)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (5-10 mol% mPEG substitution, MW 3600Da) MOLECULAR WEIGHT: 3600 Da		PGA1465.0100 PGA1465.0500 PGA1465.1000	100 mg 500 mg 1 g	€ 675,00 € 1995,00 € 2250,00
PGA1470 nBu-PGA(50)[mPEG(10)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (5-10 mol% mPEG substitution, MW 9200Da) MOLECULAR WEIGHT: 9200 Da		PGA1470.0100 PGA1470.0500 PGA1470.1000	100 mg 500 mg 1 g	€ 675,00 € 1995,00 € 2250,00
PGA1475 nBu-PGA(100)[mPEG(10)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (5-10 mol% mPEG substitution, MW 18400Da) MOLECULAR WEIGHT: 18400 Da		PGA1475.0100 PGA1475.0500 PGA1475.1000	100 mg 500 mg 1 g	€ 675,00 € 1995,00 € 2250,00
PGA1477 nBu-PGA(150)[mPEG(10)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (5-10 mol% mPEG substitution, MW 26600Da) MOLECULAR WEIGHT: 26600 Da		PGA1477.0100 PGA1477.0500 PGA1477.1000	100 mg 500 mg 1 g	€ 675,00 € 1995,00 € 2250,00
PGA1480 nBu-PGA(200)[mPEG(10)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (5-10 mol% mPEG substitution, MW 36900Da) MOLECULAR WEIGHT: 36900 Da		PGA1480.0100 PGA1480.0500 PGA1480.1000	100 mg 500 mg 1 g	€ 675,00 € 1995,00 € 2250,00
PGA1482 nBu-PGA(300)[mPEG(10)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (5-10 mol% mPEG substitution, MW 53200Da) MOLECULAR WEIGHT: 53200 Da		PGA1482.0100 PGA1482.0500 PGA1482.1000	100 mg 500 mg 1 g	€ 675,00 € 1995,00 € 2250,00
PGA1490 nBu-PGA(20)[mPEG(20)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (10-20 mol% mPEG substitution, MW 4300Da) MOLECULAR WEIGHT: 4300 Da		PGA1490.0100 PGA1490.0500 PGA1490.1000	100 mg 500 mg 1 g	€ 875,00 € 2875,00 € 3150,00
PGA1495 nBu-PGA(50)[mPEG(20)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (10-20 mol% mPEG substitution, MW 10900Da) MOLECULAR WEIGHT: 10900 Da		PGA1495.0100 PGA1495.0500 PGA1495.1000	100 mg 500 mg 1 g	€ 875,00 € 2875,00 € 3150,00
PGA1500 nBu-PGA(100)[mPEG(20)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (10-20 mol% mPEG substitution, MW 21800Da) MOLECULAR WEIGHT: 21800 Da		PGA1500.0100 PGA1500.0500 PGA1500.1000	100 mg 500 mg 1 g	€ 875,00 € 2875,00 € 3150,00

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PGA1502 nBu-PGA(150)[mPEG(20)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (10-20 mol% mPEG substitution, MW 30400Da) MOLECULAR WEIGHT: 30400 Da		PGA1502.0100 PGA1502.0500 PGA1502.1000	100 mg 500 mg 1 g	€ 875,00 € 2875,00 € 3150,00
PGA1505 nBu-PGA(200)[mPEG(20)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (10-20 mol% mPEG substitution, MW 40600Da) MOLECULAR WEIGHT: 40600 Da		PGA1505.0100 PGA1505.0500 PGA1505.1000	100 mg 500 mg 1 g	€ 875,00 € 2875,00 € 3150,00
PGA1507 nBu-PGA(300)[mPEG(20)] n-Butyl-poly(L-glutamic acid gamma-(omega-methoxy hepta(ethylene glycol))) sodium salt (10-20 mol% mPEG substitution, MW 60800Da) MOLECULAR WEIGHT: 60800 Da		PGA1507.0100 PGA1507.0500 PGA1507.1000	100 mg 500 mg 1 g	€ 875,00 € 2875,00 € 3150,00
PGA1800 nBu-PGA(20)[Hyd(10)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (5-10 mol% substitution, MW 3200Da) MOLECULAR WEIGHT: 3200 Da		PGA1800.0100 PGA1800.0500 PGA1800.1000 PGA1800.5000	100 mg 500 mg 1 g 5 g	€ 200,00 € 500,00 € 700,00 € 3100,00
PGA1860 nBu-PGA(50)[Hyd(10)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (5-10 mol% substitution, MW 7900Da) MOLECULAR WEIGHT: 7900 Da		PGA1860.0100 PGA1860.0500 PGA1860.1000 PGA1860.5000	100 mg 500 mg 1 g 5 g	€ 200,00 € 500,00 € 700,00 € 3100,00
PGA1760 nBu-PGA(100)[Hyd(10)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (5-10 mol% substitution, MW 15500Da) MOLECULAR WEIGHT: 15500 Da		PGA1760.0100 PGA1760.0500 PGA1760.1000 PGA1760.5000	100 mg 500 mg 1 g 5 g	€ 200,00 € 500,00 € 700,00 € 3100,00
PGA1780 nBu-PGA(150)[Hyd(10)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (5-10 mol% substitution, MW 23700Da) MOLECULAR WEIGHT: 23700 Da		PGA1780.0100 PGA1780.0500 PGA1780.1000 PGA1780.5000	100 mg 500 mg 1 g 5 g	€ 200,00 € 500,00 € 700,00 € 3100,00
PGA1820 nBu-PGA(200)[Hyd(10)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (5-10 mol% substitution, MW 31000Da) MOLECULAR WEIGHT: 31000 Da		PGA1820.0100 PGA1820.0500 PGA1820.1000 PGA1820.5000	100 mg 500 mg 1 g 5 g	€ 200,00 € 500,00 € 700,00 € 3100,00
PGA1840 nBu-PGA(300)[Hyd(10)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (5-10 mol% substitution, MW 47300Da) MOLECULAR WEIGHT: 47300 Da		PGA1840.0100 PGA1840.0500 PGA1840.1000 PGA1840.5000	100 mg 500 mg 1 g 5 g	€ 200,00 € 500,00 € 700,00 € 3100,00

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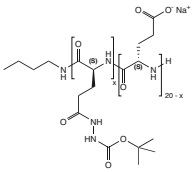
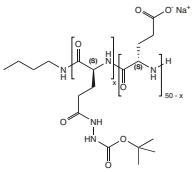
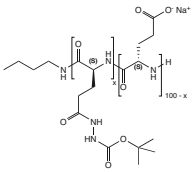
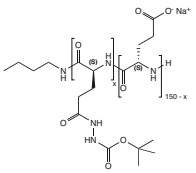
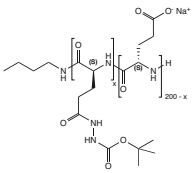
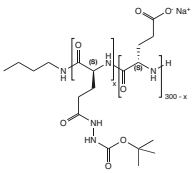
		Article No.	Quantity	Price
PGA1810 nBu-PGA(20)[Hyd(20)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (10-20 mol% substitution, MW 3700Da) MOLECULAR WEIGHT: 3700 Da		PGA1810.0100	100 mg	€ 360,00
		PGA1810.0500	500 mg	€ 750,00
		PGA1810.1000	1 g	€ 1150,00
		PGA1810.5000	5 g	€ 3200,00
PGA1870 nBu-PGA(50)[Hyd(20)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (10-20 mol% substitution, MW 9900Da) MOLECULAR WEIGHT: 9900 Da		PGA1870.0100	100 mg	€ 360,00
		PGA1870.0500	500 mg	€ 750,00
		PGA1870.1000	1 g	€ 1150,00
		PGA1870.5000	5 g	€ 3200,00
PGA1770 nBu-PGA(100)[Hyd(20)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (10-20 mol% substitution, MW 20200Da) MOLECULAR WEIGHT: 20200 Da		PGA1770.0100	100 mg	€ 360,00
		PGA1770.0500	500 mg	€ 750,00
		PGA1770.1000	1 g	€ 1150,00
		PGA1770.5000	5 g	€ 3200,00
PGA1790 nBu-PGA(150)[Hyd(20)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (10-20 mol% substitution, MW 29000Da) MOLECULAR WEIGHT: 29000 Da		PGA1790.0100	100 mg	€ 360,00
		PGA1790.0500	500 mg	€ 750,00
		PGA1790.1000	1 g	€ 1150,00
		PGA1790.5000	5 g	€ 3200,00
PGA1830 nBu-PGA(200)[Hyd(20)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (10-20 mol% substitution, MW 40100Da) MOLECULAR WEIGHT: 40100 Da		PGA1830.0100	100 mg	€ 360,00
		PGA1830.0500	500 mg	€ 750,00
		PGA1830.1000	1 g	€ 1150,00
		PGA1830.5000	5 g	€ 3200,00
PGA1850 nBu-PGA(300)[Hyd(20)] n-Butyl-poly(L-glutamic acid gamma-t-butyl carbazate) sodium salt (10-20 mol% substitution, MW 59600Da) MOLECULAR WEIGHT: 59600 Da		PGA1850.0100	100 mg	€ 360,00
		PGA1850.0500	500 mg	€ 750,00
		PGA1850.1000	1 g	€ 1150,00
		PGA1850.5000	5 g	€ 3200,00

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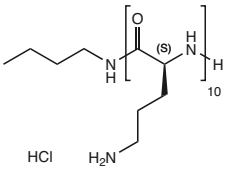
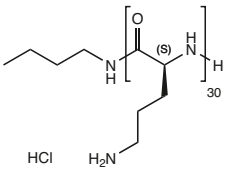
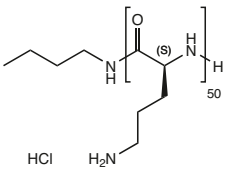
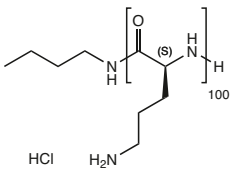
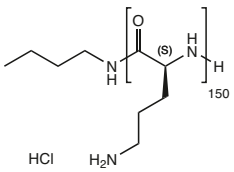
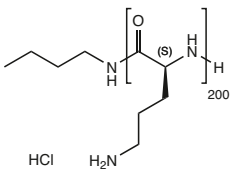
2.3 Polyornithine

		Article No.	Quantity	Price
POR1000 **nBu-POR(10)*HCl** n-Butyl-poly-L-Ornithine hydrochloride (MW 1500Da) CAS-NO: 26982-21-8 MOLECULAR WEIGHT: 1500 Da		POR1000.0100	100 mg	€ 125,00
		POR1000.0500	500 mg	€ 525,00
		POR1000.1000	1 g	€ 750,00
		POR1000.5000	5 g	€ 1475,00
		POR1000.9001	10 g	€ 1775,00
POR1010 **nBu-POR(30)*HCl** n-Butyl-poly-L-Ornithine hydrochloride (MW 4500Da) CAS-NO: 26982-21-8 MOLECULAR WEIGHT: 4500 Da		POR1010.0100	100 mg	€ 125,00
		POR1010.0500	500 mg	€ 525,00
		POR1010.1000	1 g	€ 750,00
		POR1010.5000	5 g	€ 1475,00
		POR1010.9001	10 g	€ 1775,00
POR1020 **nBu-POR(50)*HCl** n-Butyl-poly-L-Ornithine hydrochloride (MW 7500Da) CAS-NO: 26982-21-8 MOLECULAR WEIGHT: 7500 Da		POR1020.0100	100 mg	€ 125,00
		POR1020.0500	500 mg	€ 525,00
		POR1020.1000	1 g	€ 750,00
		POR1020.5000	5 g	€ 1475,00
		POR1020.9001	10 g	€ 1775,00
POR1030 **nBu-POR(100)*HCl** n-Butyl-poly-L-Ornithine hydrochloride (MW 15000Da) CAS-NO: 26982-21-8 MOLECULAR WEIGHT: 15000 Da		POR1030.0100	100 mg	€ 125,00
		POR1030.0500	500 mg	€ 525,00
		POR1030.1000	1 g	€ 750,00
		POR1030.5000	5 g	€ 1475,00
		POR1030.9001	10 g	€ 1775,00
POR1040 **nBu-POR(150)*HCl** n-Butyl-poly-L-Ornithine hydrochloride (MW 22600Da) CAS-NO: 26982-21-8 MOLECULAR WEIGHT: 22600 Da		POR1040.0100	100 mg	€ 125,00
		POR1040.0500	500 mg	€ 525,00
		POR1040.1000	1 g	€ 750,00
		POR1040.5000	5 g	€ 1475,00
		POR1040.9001	10 g	€ 1775,00
POR1050 **nBu-POR(200)*HCl** n-Butyl-poly-L-Ornithine hydrochloride (MW 30100Da) CAS-NO: 26982-21-8 MOLECULAR WEIGHT: 30100 Da		POR1050.0100	100 mg	€ 125,00
		POR1050.0500	500 mg	€ 525,00
		POR1050.1000	1 g	€ 750,00
		POR1050.5000	5 g	€ 1475,00
		POR1050.9001	10 g	€ 1775,00

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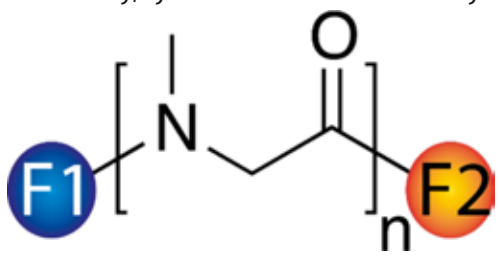
2.4 Polysarcosine – a True Alternative to PEG

The PEGylation technology has transformed the fields of bioconjugation, drug delivery and nanomedicine tremendously. PEGylation of surfaces, drugs and biologics has become a multi-billion euro business. However, a heavily crowded patent landscape, reports of patients failing treatment due to anti-PEG antibodies and concerns over the long-term safety of PEG have triggered intensive research efforts to find suitable alternative technologies. Among those potential alternatives, polypeptoids in general and polysarcosine (PSR) in particular stand out in terms of safety, synthetic control and versatility.



Monofunctional, homo- and heterobifunctional PSR with a wide variety of functional groups F1 and F2 are offered. Degrees of polymerization n may range from below 10 to above 1.000. Thus, molar masses of approx. 1 kg/mol to 100 kg/mol are possible.

In brief, PSR is characterized by the following properties:

- **Biobased, degradable and non-immunogenic.**
- **Low protein adsorption.**
- **Excellent water solubility and solubility in organic solvents.**
- **Highly defined polymers with narrow poisson-distribution.**
- **Mono-, homo- and heterobifunctional; custom-designed functionalities upon request.**
- **Excellent shelf-life, reproducibility and analytical purity.**

Polysarcosine – The biobased macromolecular tool with excellent dispersity and designability

Polysarcosine (PSR) – originating from the natural, non-toxic amino acid sarcosine (N-Methylglycine) – is the simplest polypeptoid and a newly rediscovered biocompatible and degradable polymer.

Polysarcosine has been employed in a number of drug delivery systems, including dendrimers [1,2], polymer micelles [3,4], polyplexes [5], protein conjugates [6,7] and micro-[8-11] and nanoparticles [12-18], polymersomes [19] and nanotubes [20,21]. However, widespread use of PSR has been hampered by lack of commercially-available functional PSR in good quality. This fact is now changed by us!

The use of PSR with functional head- and tail-groups for bioconjugation is comparable to the well-known PEGylation technology. A wide range of functional terminal groups can be realized. However, in contrast to PEG, PSR is intrinsically heterobifunctional (-COOH, -NH_2). Therefore, the scope of the heterofunctional building-block design is extensive. As an early adopter of the PSR technology, you will have a competitive advantage over users of the ever-present PEGylation. Functional polysarcosine offers a great opportunity to create innovation and opportunities in many different fields of applications. Don´t allow your creativity to be limited!

Furthermore, PSR is a hydrophilic polymer [22] that shows excellent non-fouling properties leading to protein-repellent surfaces [23,24] and long-circulating polymers or polymer nanoparticles [17,18]. Moreover, it is degradable under physiologically relevant conditions [25], exhibits low immunogenicity [26,27] and low toxicity.

PSR is accessible via nucleophilic living condensative ring-opening polymerization (NuLCROP) of sarcosine N-carboxyanhydride, and thus is highly defined with very low dispersities (Poisson distribution) and excellent reproducibility [28]. We offer a large variety of attractive chemical functionalities such as amines, azides, alkynes and thiols for bioconjugation to drugs, proteins and surfaces of your choice.

We also offer a range of molar masses, favorable for bioconjugation and use as biomaterials. Conveniently, for further modifications, PSR exhibits excellent water solubility and solubility in a wide range of organic solvents [22]. To analyze your bioconjugate conveniently, the polymer is UV-active at 200-220 nm, which allows detection using standard HPLC equipment and UV-Vis spectrometers.

In summary, PSR technology is a novel toolkit of non-ionic, non-toxic and non-immunogenic hydrophilic and organosoluble polymers with a wide range of functionalities.

Prices are in EUR, net, exw Germany

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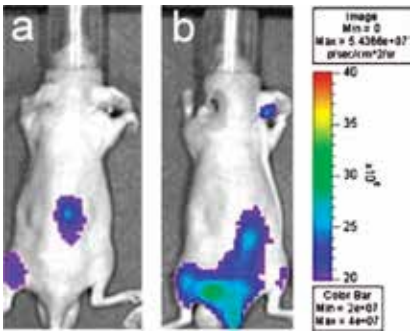
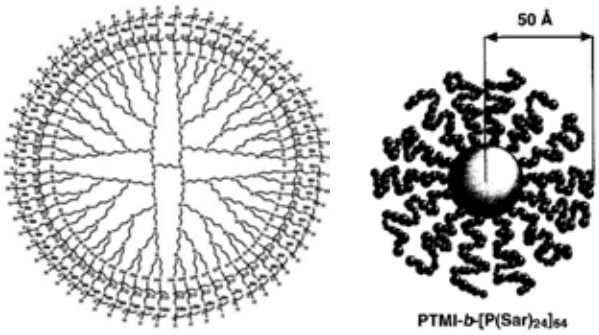
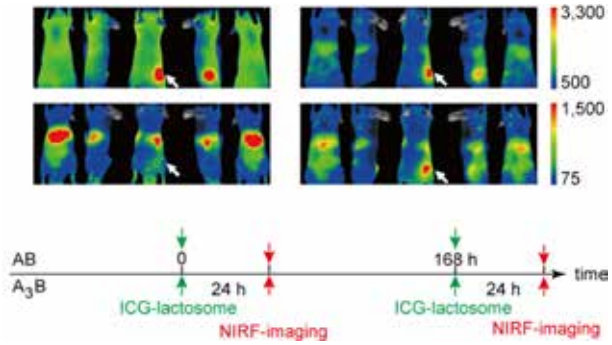


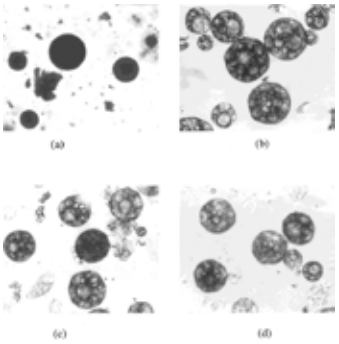
In vivo cancer imaging using NIRF-labeled peptosome (ICGlabeled). (a) Image of xenografts on the tumor-bearing mouse after first administration. (b) Image of fluorescence from ICG, 1 day after the administration of ICG-labeled peptosome.



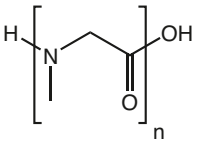
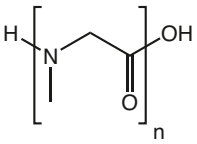
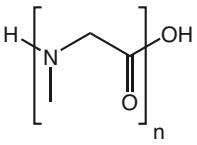
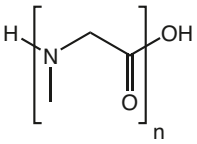
Star-shaped poly(trimethyleneimine) dendrimer-block-(polysarcosine)64 and schematic illustration of size



Pharmacokinetic changes (NIRF images) upon multiple doses of the AB- and A3B-type lactosomes. The images were taken at 7 days after the first administration of the AB- and A3B-type lactosomes.



Optical micrographs of PLys-b-PSar microcapsules. (a) Before deblocking and suspended in the medium of pH 7.5, (b) after deblocking and suspended in the medium of pH 7.5, and suspended in the medium of (c) pH 3.0 and (d) pH 7.5.

		Article No.	Quantity	Price
PSR1080 **H-PSar(n)-OH** Polysarcosine MOLECULAR WEIGHT: 1100 Da		PSR1080.0500 PSR1080.0001 PSR1080.0005	500 mg 1 g 5 g	€ 300,00 € 450,00 € 1780,00
PSR1090 **H-PSar(n)-OH** Polysarcosine MOLECULAR WEIGHT: 2100 Da		PSR1090.0500 PSR1090.0001 PSR1090.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1100 **H-PSar(n)-OH** Polysarcosine MOLECULAR WEIGHT: 5100 Da		PSR1100.0500 PSR1100.0001 PSR1100.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1110 **H-PSar(n)-OH** Polysarcosine MOLECULAR WEIGHT: 10100 Da		PSR1110.0500 PSR1110.0001 PSR1110.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00

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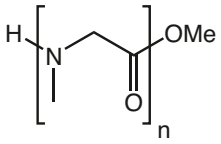
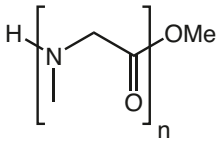
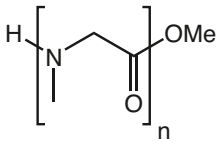
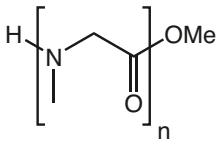
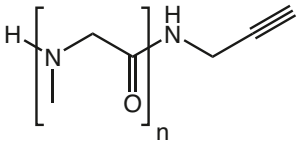
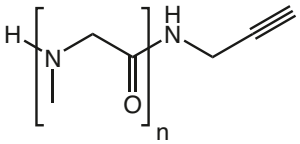
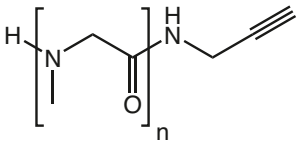
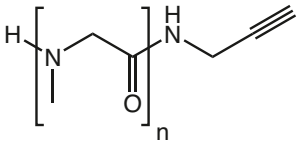
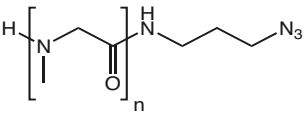
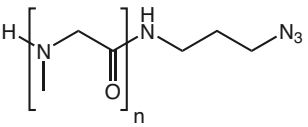
		Article No.	Quantity	Price
PSR1120 **H-PSar(n)-OMe** Polysarcosine omega-methyl ester MOLECULAR WEIGHT: 1100 Da		PSR1120.0500 PSR1120.0001 PSR1120.0005	500 mg 1 g 5 g	€ 300,00 € 450,00 € 1780,00
PSR1130 **H-PSar(n)-OMe** Polysarcosine omega-methyl ester MOLECULAR WEIGHT: 2100 Da		PSR1130.0500 PSR1130.0001 PSR1130.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1140 **H-PSar(n)-OMe** Polysarcosine omega-methyl ester MOLECULAR WEIGHT: 5100 Da		PSR1140.0500 PSR1140.0001 PSR1140.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1150 **H-PSar(n)-OMe** Polysarcosine omega-methyl ester MOLECULAR WEIGHT: 10100 Da		PSR1150.0500 PSR1150.0001 PSR1150.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1160 **H-PSar(n)-alkyne** Polysarcosine omega-propargyl amide MOLECULAR WEIGHT: 1100 Da		PSR1160.0500 PSR1160.0001 PSR1160.0005	500 mg 1 g 5 g	€ 300,00 € 450,00 € 1780,00
PSR1170 **H-PSar(n)-alkyne** Polysarcosine omega-propargyl amide MOLECULAR WEIGHT: 2000 Da		PSR1170.0500 PSR1170.0001 PSR1170.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1180 **H-PSar(n)-alkyne** Polysarcosine omega-propargyl amide MOLECULAR WEIGHT: 5000 Da		PSR1180.0500 PSR1180.0001 PSR1180.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1190 **H-PSar(n)-alkyne** Polysarcosine omega-propargyl amide MOLECULAR WEIGHT: 10000 Da		PSR1190.0500 PSR1190.0001 PSR1190.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1280 **H-PSar(n)-N_3** Polysarcosine omega-azidopropyl amide MOLECULAR WEIGHT: 1100 Da		PSR1280.0500 PSR1280.0001 PSR1280.0005	500 mg 1 g 5 g	€ 390,00 € 590,00 € 2350,00
PSR1290 **H-PSar(n)-N_3** Polysarcosine omega-azidopropyl amide MOLECULAR WEIGHT: 2100 Da		PSR1290.0500 PSR1290.0001 PSR1290.0005	500 mg 1 g 5 g	€ 330,00 € 500,00 € 2000,00

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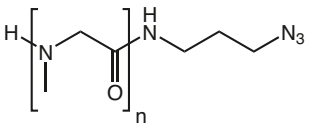
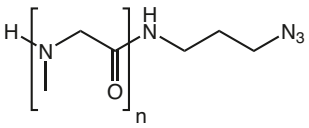
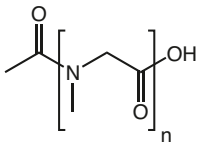
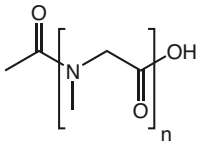
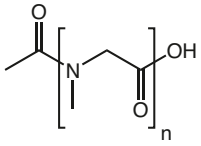
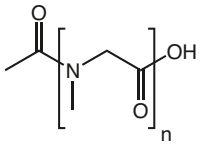
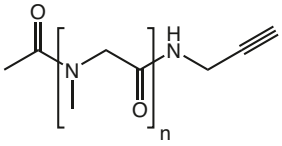
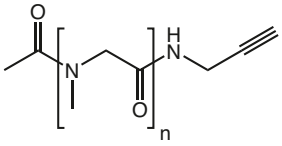
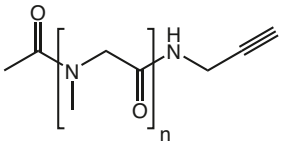
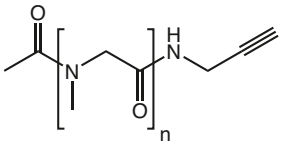
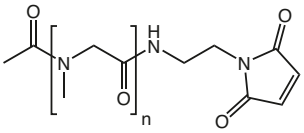
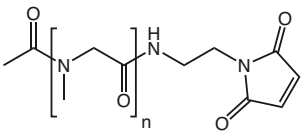
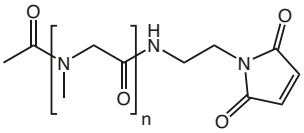
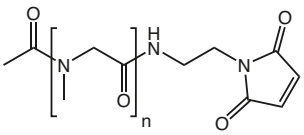
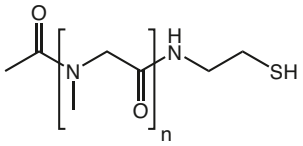
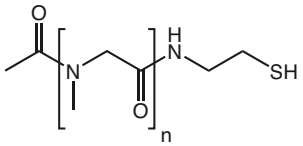
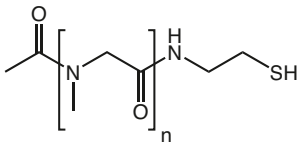
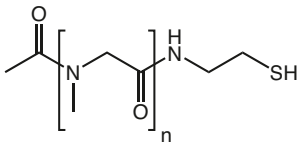
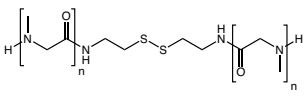
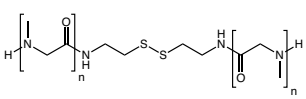
		Article No.	Quantity	Price
PSR1300 **H-PSar(n)-N_3**		PSR1300.0500	500 mg	€ 300,00
Polysarcosine omega-azidopropyl amide		PSR1300.0001	1 g	€ 450,00
MOLECULAR WEIGHT: 5100 Da		PSR1300.0005	5 g	€ 1780,00
PSR1310 **H-PSar(n)-N_3**		PSR1310.0500	500 mg	€ 280,00
Polysarcosine omega-azidopropyl amide		PSR1310.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 10100 Da		PSR1310.0005	5 g	€ 1720,00
PSR1200 **Ac-PSar(n)-OH**		PSR1200.0500	500 mg	€ 300,00
N-alpha-Acetyl-polysarcosine		PSR1200.0001	1 g	€ 450,00
MOLECULAR WEIGHT: 1100 Da		PSR1200.0005	5 g	€ 1780,00
PSR1210 **Ac-PSar(n)-OH**		PSR1210.0500	500 mg	€ 280,00
N-alpha-Acetyl-polysarcosine		PSR1210.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 2100 Da		PSR1210.0005	5 g	€ 1720,00
PSR1220 **Ac-PSar(n)-OH**		PSR1220.0500	500 mg	€ 280,00
N-alpha-Acetyl-polysarcosine		PSR1220.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 5100 Da		PSR1220.0005	5 g	€ 1720,00
PSR1230 **Ac-PSar(n)-OH**		PSR1230.0500	500 mg	€ 280,00
N-alpha-Acetyl-polysarcosine		PSR1230.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 10100 Da		PSR1230.0005	5 g	€ 1720,00
PSR1320 **Ac-PSar(n)-alkyne**		PSR1320.0500	500 mg	€ 300,00
N-alpha-Acetyl-polysarcosine omega-propargyl amide		PSR1320.0001	1 g	€ 450,00
MOLECULAR WEIGHT: 1100 Da		PSR1320.0005	5 g	€ 1780,00
PSR1330 **Ac-PSar(n)-alkyne**		PSR1330.0500	500 mg	€ 280,00
N-alpha-Acetyl-polysarcosine omega-propargyl amide		PSR1330.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 2100 Da		PSR1330.0005	5 g	€ 1720,00
PSR1340 **Ac-PSar(n)-alkyne**		PSR1340.0500	500 mg	€ 280,00
N-alpha-Acetyl-polysarcosine omega-propargyl amide		PSR1340.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 5100 Da		PSR1340.0005	5 g	€ 1720,00
PSR1350 **Ac-PSar(n)-alkyne**		PSR1350.0500	500 mg	€ 280,00
N-alpha-Acetyl-polysarcosine omega-propargyl amide		PSR1350.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 10000 Da		PSR1350.0005	5 g	€ 1720,00

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PSR1400	**Ac-PSar(n)-mal**			
N-alpha-Acetyl-polysarcosine omega-maleimidoethyl amide MOLECULAR WEIGHT: 1200 Da				please inquire!
PSR1410	**Ac-PSar(n)-mal**			
N-alpha-Acetyl-polysarcosine omega-maleimidoethyl amide MOLECULAR WEIGHT: 2200 Da				please inquire!
PSR1420	**Ac-PSar(n)-mal**			
N-alpha-Acetyl-polysarcosine omega-maleimidoethyl amide MOLECULAR WEIGHT: 5200 Da				please inquire!
PSR1430	**Ac-PSar(n)-mal**			
N-alpha-Acetyl-polysarcosine omega-maleimidoethyl amide MOLECULAR WEIGHT: 10100 Da				please inquire!
PSR1440	**Ac-PSar(n)-SH**			
N-alpha-Acetyl-polysarcosine omega-cystamide MOLECULAR WEIGHT: 1100 Da		PSR1440.0500 PSR1440.0001 PSR1440.0005	500 mg 1 g 5 g	€ 300,00 € 450,00 € 1780,00
PSR1450	**Ac-PSar(n)-SH**			
N-alpha-Acetyl-polysarcosine omega-cystamide MOLECULAR WEIGHT: 2100 Da		PSR1450.0500 PSR1450.0001 PSR1450.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1460	**Ac-PSar(n)-SH**			
N-alpha-Acetyl-polysarcosine omega-cystamide MOLECULAR WEIGHT: 5100 Da		PSR1460.0500 PSR1460.0001 PSR1460.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1470	**Ac-PSar(n)-SH**			
N-alpha-Acetyl-polysarcosine omega-cystamide MOLECULAR WEIGHT: 10100 Da		PSR1470.0500 PSR1470.0001 PSR1470.0005	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00
PSR1700	**(H-PSar(n)-S)$_2$**			
Bis(polysarcosine omega-cystamide) MOLECULAR WEIGHT: 1200 Da		PSR1700.0500 PSR1700.5000 PSR1700.1000	500 mg 5 g 1 g	€ 300,00 € 1780,00 € 450,00
PSR1710	**(H-PSar(n)-S)$_2$**			
Bis(polysarcosine omega-cystamide) MOLECULAR WEIGHT: 2100 Da		PSR1710.0500 PSR1710.1000 PSR1710.5000	500 mg 1 g 5 g	€ 280,00 € 430,00 € 1720,00

Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price
PSR1720 (H-PSar(n)-S)$_2$ Bis(polysarcosine omega-cystamide) MOLECULAR WEIGHT: 5100 Da	PSR1720.0500	500 mg	€ 280,00
	PSR1720.1000	1 g	€ 430,00
	PSR1720.5000	5 g	€ 1720,00
PSR1730 (H-PSar(n)-S)$_2$ Bis(polysarcosine omega-cystamide) MOLECULAR WEIGHT: 10100 Da	PSR1730.0500	500 mg	€ 280,00
	PSR1730.1000	1 g	€ 430,00
	PSR1730.5000	5 g	€ 1720,00
PSR1480 (Ac-PSar(n)-S)$_2$ Bis(N-alpha-acetyl-polysarcosine omega-cystamide) MOLECULAR WEIGHT: 1200 Da	PSR1480.0500	500 mg	€ 300,00
	PSR1480.0001	1 g	€ 450,00
	PSR1480.0005	5 g	€ 1780,00
PSR1490 (Ac-PSar(n)-S)$_2$ Bis(N-alpha-acetyl-polysarcosine omega-cystamide) MOLECULAR WEIGHT: 2200 Da	PSR1490.0500	500 mg	€ 280,00
	PSR1490.0001	1 g	€ 430,00
	PSR1490.0005	5 g	€ 1720,00
PSR1500 (Ac-PSar(n)-S)$_2$ Bis(N-alpha-acetyl-polysarcosine omega-cystamide) MOLECULAR WEIGHT: 5200 Da	PSR1500.0500	500 mg	€ 280,00
	PSR1500.0001	1 g	€ 430,00
	PSR1500.0005	5 g	€ 1720,00
PSR1510 (Ac-PSar(n)-S)$_2$ Bis(N-alpha-acetyl-polysarcosine omega-cystamide) MOLECULAR WEIGHT: 10100 Da	PSR1510.0500	500 mg	€ 280,00
	PSR1510.0001	1 g	€ 430,00
	PSR1510.0005	5 g	€ 1720,00

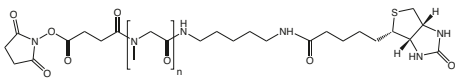
PSR1520 Lipoamide-PSar(n)-OH N-alpha-Lipoamide-polysarcosine MOLECULAR WEIGHT: 1300 Da	please inquire!
PSR1530 Lipoamide-PSar(n)-OH N-alpha-Lipoamide-polysarcosine MOLECULAR WEIGHT: 2300 Da	please inquire!
PSR1540 Lipoamide-PSar(n)-OH N-alpha-Lipoamide-polysarcosine MOLECULAR WEIGHT: 5300 Da	please inquire!
PSR1550 Lipoamide-PSar(n)-OH N-alpha-Lipoamide-polysarcosine MOLECULAR WEIGHT: 10200 Da	please inquire!

Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price

PSR1580 Biotin-PSar(n)-NHS

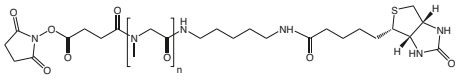
N-alpha-Biotin-polysarcosine omega-carboxy succinimidyl ester
MOLECULAR WEIGHT: 1600 Da



please inquire!

PSR1590 Biotin-PSar(n)-NHS

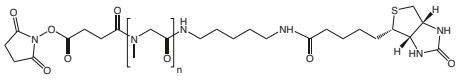
N-alpha-Biotin-polysarcosine omega-carboxy succinimidyl ester
MOLECULAR WEIGHT: 2600 Da



please inquire!

PSR1600 Biotin-PSar(n)-NHS

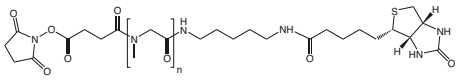
N-alpha-Biotin-polysarcosine omega-carboxy succinimidyl ester
MOLECULAR WEIGHT: 5600 Da



please inquire!

PSR1610 Biotin-PSar(n)-NHS

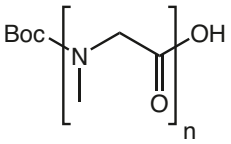
N-alpha-Biotin-polysarcosine omega-carboxy succinimidyl ester
MOLECULAR WEIGHT: 10600 Da



please inquire!

PSR1000 Boc-PSar(n)-OH

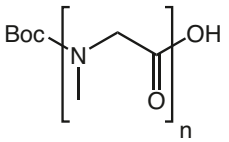
N-alpha-t-Butyloxycarbonyl-polysarcosine
MOLECULAR WEIGHT: 1200 Da



PSR1000.0500	500 mg	€	300,00
PSR1000.0001	1 g	€	450,00
PSR1000.0005	5 g	€	1780,00

PSR1010 Boc-PSar(n)-OH

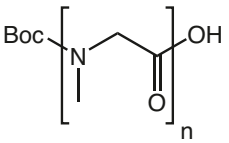
N-alpha-t-Butyloxycarbonyl-polysarcosine
MOLECULAR WEIGHT: 2200 Da



PSR1010.0500	500 mg	€	280,00
PSR1010.0001	1 g	€	430,00
PSR1010.0005	5 g	€	1720,00

PSR1020 Boc-PSar(n)-OH

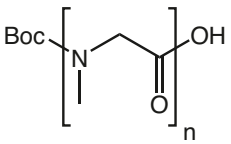
N-alpha-t-Butyloxycarbonyl-polysarcosine
MOLECULAR WEIGHT: 5200 Da



PSR1020.0500	500 mg	€	280,00
PSR1020.0001	1 g	€	430,00
PSR1020.0005	5 g	€	1720,00

PSR1030 Boc-PSar(n)-OH

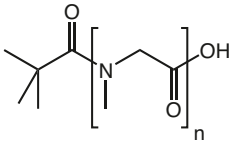
N-alpha-t-Butyloxycarbonyl-polysarcosine
MOLECULAR WEIGHT: 10200 Da



PSR1030.0500	500 mg	€	280,00
PSR1030.0001	1 g	€	430,00
PSR1030.0005	5 g	€	1720,00

PSR1240 tBu-PSar(n)-OH

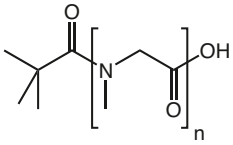
Polysarcosine pivalate
MOLECULAR WEIGHT: 1200 Da



PSR1240.0500	500 mg	€	300,00
PSR1240.0001	1 g	€	450,00
PSR1240.0005	5 g	€	1780,00

PSR1250 tBu-PSar(n)-OH

Polysarcosine pivalate
MOLECULAR WEIGHT: 2200 Da



PSR1250.0500	500 mg	€	280,00
PSR1250.0001	1 g	€	430,00
PSR1250.0005	5 g	€	1720,00

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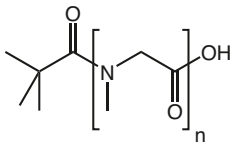
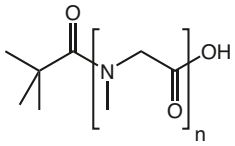
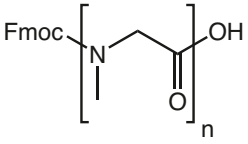
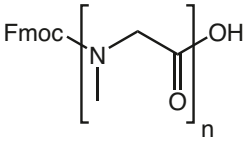
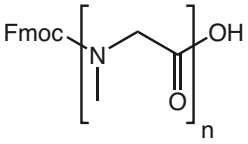
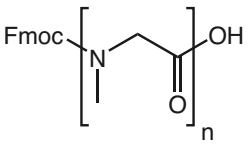
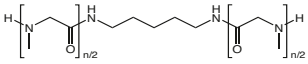
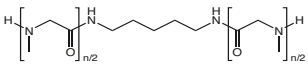
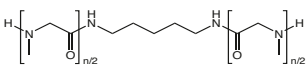
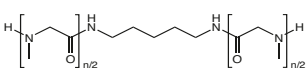
		Article No.	Quantity	Price
PSR1260 **tBu-PSar(n)-OH**		PSR1260.0500	500 mg	€ 280,00
Polysarcosine pivalate		PSR1260.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 5200 Da		PSR1260.0005	5 g	€ 1720,00
PSR1270 **tBu-PSar(n)-OH**		PSR1270.0500	500 mg	€ 280,00
Polysarcosine pivalate		PSR1270.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 10100 Da		PSR1270.0005	5 g	€ 1720,00
PSR1040 **Fmoc-PSar(n)-OH**		PSR1040.0500	500 mg	€ 420,00
N-alpha-(9-Fluorenylmethyloxycarbonyl)-polysarcosine		PSR1040.0001	1 g	€ 630,00
MOLECULAR WEIGHT: 1300 Da		PSR1040.0005	5 g	€ 2520,00
PSR1050 **Fmoc-PSar(n)-OH**		PSR1050.0500	500 mg	€ 340,00
N-alpha-(9-Fluorenylmethyloxycarbonyl)-polysarcosine		PSR1050.0001	1 g	€ 520,00
MOLECULAR WEIGHT: 2300 Da		PSR1050.0005	5 g	€ 2060,00
PSR1060 **Fmoc-PSar(n)-OH**		PSR1060.0500	500 mg	€ 310,00
N-alpha-(9-Fluorenylmethyloxycarbonyl)-polysarcosine		PSR1060.0001	1 g	€ 460,00
MOLECULAR WEIGHT: 5300 Da		PSR1060.0005	5 g	€ 1830,00
PSR1070 **Fmoc-PSar(n)-OH**		PSR1070.0500	500 mg	€ 300,00
N-alpha-(9-Fluorenylmethyloxycarbonyl)-polysarcosine		PSR1070.0001	1 g	€ 450,00
MOLECULAR WEIGHT: 10300 Da		PSR1070.0005	5 g	€ 1780,00
PSR1620 **HN-PSar(n)-NH**		PSR1620.0500	500 mg	€ 280,00
Bis(omega-polysarcosine) hexanediamide		PSR1620.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 1100 Da		PSR1620.0005	5 g	€ 1720,00
PSR1630 **HN-PSar(n)-NH**		PSR1630.0500	500 mg	€ 280,00
Bis(omega-polysarcosine) hexanediamide		PSR1630.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 2100 Da		PSR1630.0005	5 g	€ 1720,00
PSR1640 **HN-PSar(n)-NH**		PSR1640.0500	500 mg	€ 280,00
Bis(omega-polysarcosine) hexanediamide		PSR1640.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 5100 Da		PSR1640.0005	5 g	€ 1720,00
PSR1650 **HN-PSar(n)-NH**		PSR1650.0500	500 mg	€ 280,00
Bis(omega-polysarcosine) hexanediamide		PSR1650.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 10100 Da		PSR1650.0005	5 g	€ 1720,00

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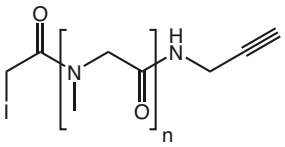
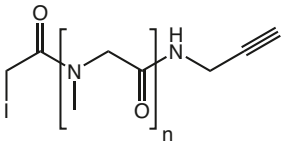
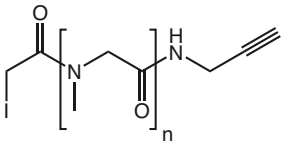
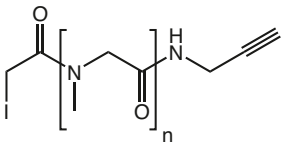
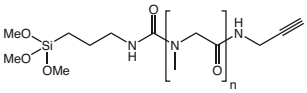
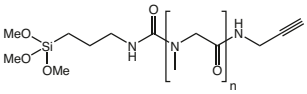
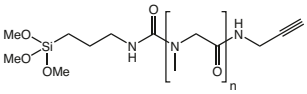
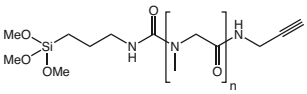
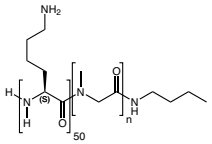
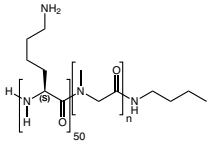
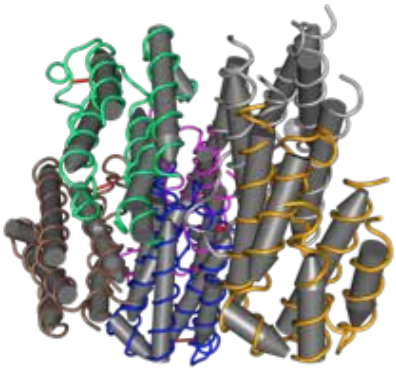
		Article No.	Quantity	Price
PSR1360	**I-PSar(n)-alkyne**	PSR1360.0500	500 mg	€ 420,00
N-alpha-Iodoacetyl-polysarcosine omega-propargyl amide		PSR1360.0001	1 g	€ 650,00
MOLECULAR WEIGHT: 1200 Da		PSR1360.0005	5 g	€ 2580,00
PSR1370	**I-PSar(n)-alkyne**	PSR1370.0500	500 mg	€ 360,00
N-alpha-Iodoacetyl-polysarcosine omega-propargyl amide		PSR1370.0001	1 g	€ 530,00
MOLECULAR WEIGHT: 2200 Da		PSR1370.0005	5 g	€ 2120,00
PSR1380	**I-PSar(n)-alkyne**	PSR1380.0500	500 mg	€ 310,00
N-alpha-Iodoacetyl-polysarcosine omega-propargyl amide		PSR1380.0001	1 g	€ 460,00
MOLECULAR WEIGHT: 5200 Da		PSR1380.0005	5 g	€ 1830,00
PSR1390	**I-PSar(n)-alkyne**	PSR1390.0500	500 mg	€ 300,00
N-alpha-Iodoacetyl-polysarcosine omega-propargyl amide		PSR1390.0001	1 g	€ 450,00
MOLECULAR WEIGHT: 10200 Da		PSR1390.0005	5 g	€ 1780,00
PSR1660	**$(MeO)_3Si$-PSar(n)-alkyne**	PSR1660.0500	500 mg	€ 310,00
N-alpha-trimethoxysilyl-polysarcosine omega-propargyl amide		PSR1660.0001	1 g	€ 480,00
MOLECULAR WEIGHT: 1300 Da		PSR1660.0005	5 g	€ 1890,00
PSR1670	**$(MeO)_3Si$-PSar(n)-alkyne**	PSR1670.0500	500 mg	€ 300,00
N-alpha-trimethoxysilyl-polysarcosine omega-propargyl amide		PSR1670.0001	1 g	€ 450,00
MOLECULAR WEIGHT: 2200 Da		PSR1670.0005	5 g	€ 1780,00
PSR1680	**$(MeO)_3Si$-PSar(n)-alkyne**	PSR1680.0500	500 mg	€ 280,00
N-alpha-trimethoxysilyl-polysarcosine omega-propargyl amide		PSR1680.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 5200 Da		PSR1680.0005	5 g	€ 1720,00
PSR1690	**$(MeO)_3Si$-PSar(n)-alkyne**	PSR1690.0500	500 mg	€ 280,00
N-alpha-trimethoxysilyl-polysarcosine omega-propargyl amide		PSR1690.0001	1 g	€ 430,00
MOLECULAR WEIGHT: 10200 Da		PSR1690.0005	5 g	€ 1720,00
PSR1560	**PLys(50)-b-PSar(n)-NH-nBu**	please inquire!		
Poly-L-lysine-block-polysarcosine omega-n-butyl amide				
MOLECULAR WEIGHT: 16400 Da				
PSR1570	**PLys(50)-b-PSar(n)-NH-nBu**	please inquire!		
Poly-L-lysine-block-polysarcosine omega-n-butyl amide				
MOLECULAR WEIGHT: 26400 Da				

Prices are in EUR, net, exw Germany

3. Poly(ethylene glycol) – the Pioneer in Polymer Therapeutics

PEGs show a spectrum of unique physical and chemical properties, which have been described in literature extensively by the pioneers in PEGylation: Harris, Veronese and recently by Hermanson. Here are summarized the most common known properties.

- PEG fragments can be attached to many different positions in a protein. Amino groups of any solvent accessible lysines as well as the N-termini are the most prominent candidates for conjugation together with thiol functions of available cysteins. The C-terminus or carboxylic groups from aspartic acid and glutamic acid in theory are also possible for conjugation, however, are rarely used.
- PEG can also serve as spacer or cross linker between two moieties.
- PEG provides high solubility and does not contain charged side chains.
- PEG is FDA approved for internal application, is non-toxic, lacks T-cell epitopes, and shows no signs of immunogenicity in animal experiments.
- PEG derivatives are available from pure, monodisperse, discrete molecules with short chain lengths or even one ethylene oxide unit only, to long polydisperse both linear and branched constructs, allowing regio-specific chemical conjugation with small molecules, proteins, peptides and biopharmaceuticals through their broad variety of terminal chemical groups available.



Interferon, one of the first PEGylated biopharmaceuticals in the market

Chemical and Physical Properties of PEGs:

- Good solubility in BOTH hydrophilic AND hydrophobic solvents as: water, toluene, methylene chloride, and many other organic solvents.
- Insoluble in: diethyl ether, hexane, ethylene glycol.
- The solubility is influenced by forming derivatives.
- Highly mobile in water with high exclusion volume; large hydrodynamic radius.
- Form complexes with metal cations.
- Can be used to precipitate proteins and nucleic acids.
- Form two-phase system with aqueous solutions of other polymers.
- Non-toxic, FDA approved for internal consumption.

PEGylating Biopharmaceuticals and Small Molecules has the following effects:

- Improves solubility of conjugated molecules.
- Renders proteins non immunogenic and toleragenic.
- Reduces the rate of renal clearance through the kidney and alters pharmacokinetics.
- Renders surface protein rejection.
- Alters electro osmotic flow.
- Moves molecules across cell membranes.

Table: PEG conjugates in the pharmaceutical market*

Trade Name/Conjugate	Company	Indication	Year to Market
Adagen® (11-17x 5 kDa mPEG per adenosin deaminase)	Enzon Inc.	severe combined immunodeficiency	1990
Oncospar® (5 kDa mPEG-L-asparaginase)	Enzon Inc. (USA) Rhone-Poulenc Rorer (EU)	acute lymphoblastic leukaemia	1994
Doxil®/Caelyx® (sterically stabilized liposome formulation of doxorubicin)	Alza Corp. (USA) Schering-Plough Corp. (EU)	Kaposi's sarcoma, ovarian cancer, breast cancer, multiple myeloma	1995
PEG-Intron® (2x 20 kDa mPEG-interferon-α-2a)	Schering-Plough Corp.	chronic hepatitis C	2000
Pegasys® (12 kDa mPEG-interferon-α-2b)	Hoffmann-La Roche	chronic hepatitis C	2002
PEG-filgrastim®, Neulasta® (20 kDa mPEG-G-CSF)	Amgen Inc.	febril neutropenia	2002
Pegvisomant®/ Somavert® (4-6 5 kDa mPEG per modified human growth receptor antagonist)	Pfizer	acromegaly	2002
Pegaptanib®, Macugen® (2x 20 kDa PEG-anti-VEGF aptamer)	Pfizer OSI Pharm Inc	age-related macular degeneration	2004
Cimizia® (2x 40 kDa mPEG-anti TNFα	UCB	Crohn's disease, rheumatoid arthritis	2008
Mircera® (30 kDa mPEG-Erythropoietin)	Hoffmann-La Roche	anaemia associated with chronic kidney disease	2011
Puricase®,Krystexxa® (pegloticase) (PEG-uricase)	Crealta Pharmaceuticals, Inc.	treatment-resistant gout and hyperuricemia	2011
Movantik®, Moventig® (naloxegol) (PEG-naloxone)	Astra Zeneca	opioid-induced constipation	2014
PEG-SN38 (multiarm PEG-camptothecan derivative)	Enzon Inc.	cancers of the colon and rectum	Phase II (2012)
NKTR-102 (Etirinotecan pegol) (PEG-irinotecan)	Nektar Therapeutics	metastatic breast cancer	Phase III (2015)

* References:

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3.1 Branched PEGylating Reagents

Branched PEGs impart significant water solubility and thus produce compounds with reduced aggregation or surfaces with reduced non-specific binding in diagnostic applications. The PEGylation reagent itself is non-immunogenic and non-toxic, passing these properties to the PEGylated biopharmaceutical.

These PEGs are potentially very useful as drug/protein modifiers to specifically increase the hydrodynamic volume.

They are highly methylene chloride soluble - the ideal solvent for carboamide activations.

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; **Ch. 18**: 711-742; ISBN 978-0-12-370501-3

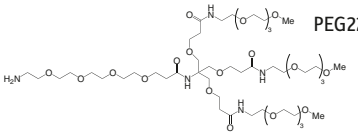
	Article No.	Quantity	Price
PEG0173 H_2N-[mPEG(4)]$_4$	PEG0173.0100	100 mg	€ 450,00
2-amino-N1,N5-bis(15,20-dioxo-2,5,8,11-tetraoxa-14,19-diaza-henicosan-21-yl)-N1,N5-di(2,5,8,11-tetraoxatridecan-13-yl)pentane-diamide FORMULA: $C_{53}H_{103}N_7O_{22}$ MOLECULAR WEIGHT: 1190,42 g/mole	PEG0173.0500	500 mg	€ 875,00
PEG0216 H_2N-[PEG(4)-PEG(10)]$_2$			please inquire!
2-amino-N1,N5-bis(15,20-dioxo-2,5,8,11-tetraoxa-14,19-diaza-henicosan-21-yl)-N1,N5-bis[omega-methoxy-undeca(ethylenglycol)-omega-yl]pentanediamide FORMULA: $C_{81}H_{159}N_7O_{36}$ MOLECULAR WEIGHT: 1807,15 g/mole			

Need GMP production of PEGs? Please inquire!

Prices are in EUR, net, exw Germany

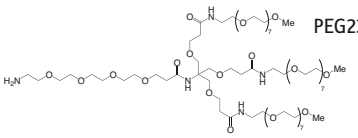
	Article No.	Quantity	Price
PEG2295 H_2N-PEG(4)-[PEG(4)-OMe]$_3$	PEG2295.0100	100 mg	€ 325,00
	PEG2295.0001	1 g	€ 1475,00

Amino-PEG(4)-[PEG(4)-OMe]$_3$
CAS-NO: 1333154-69-0
FORMULA: $C_{51}H_{101}N_5O_{23}$
MOLECULAR WEIGHT: 1152,37 g/mole
FURTHER INFORMATION: Spacer length 37 atoms or 21 A



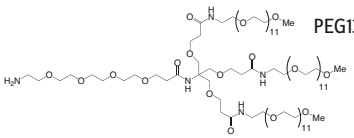
	Article No.	Quantity	Price
PEG2315 H_2N-PEG(4)-[PEG(8)-OMe]$_3$	PEG2315.0100	100 mg	€ 325,00
	PEG2315.0001	1 g	€ 1475,00

Amino-PEG(4)-[PEG(8)-OMe]$_3$
CAS-NO: 1333154-73-6
FORMULA: $C_{75}H_{149}N_5O_{35}$
MOLECULAR WEIGHT: 1681 g/mole
FURTHER INFORMATION: Spacer length 49 atoms or 50 A



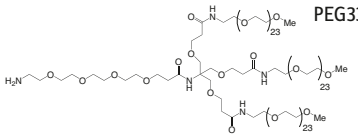
	Article No.	Quantity	Price
PEG1325 H_2N-dPEG™(4)-[dPEG™(12)-OMe]$_3$	PEG1325.0100	100 mg	€ 325,00
	PEG1325.0001	1 g	€ 1475,00

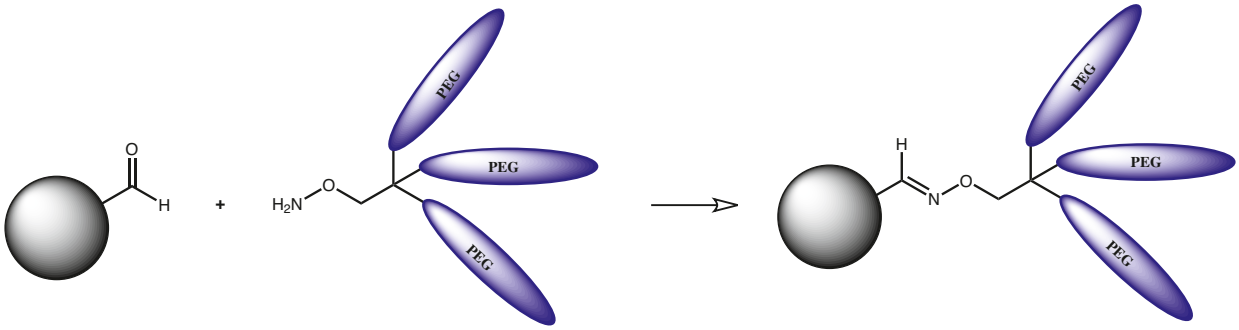
Amino-PEG(4)-[PEG(12)-OMe]$_3$
CAS-NO: 1334178-02-7
FORMULA: $C_{99}H_{197}N_5O_{47}$
MOLECULAR WEIGHT: 2209,63 g/mole
FURTHER INFORMATION: Spacer length 61 atoms or 63 A



	Article No.	Quantity	Price
PEG3350 H_2N-dPEG™(4)-[dPEG™(24)-OMe]$_3$	PEG3350.0100	100 mg	€ 420,00
	PEG3350.1000	1 g	€ 1800,00

Amino-PEG(4)-[PEG(24)-OMe]$_3$
CAS-NO: 1334178-02-7
FORMULA: $C_{171}H_{341}N_5O_{83}$
MOLECULAR WEIGHT: 3795,52 g/mole
FURTHER INFORMATION: Spacer length 97 atoms or 96.2 A

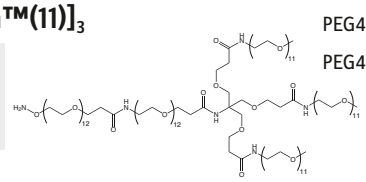




Aldehydes are common in carbohydrates, carbohydrate containing proteins, oxidizable matrices, among others and also can be incorporated using appropriate reagents, like glucar dialdehyde or more sophisticated derivatives.

	Article No.	Quantity	Price
PEG4640 Aminoxy-dPEG™(12+12)-[mdPEG™(11)]$_3$	PEG4640.0100	100 mg	€ 455,00
	PEG4640.1000	1 g	€ 2300,00

alpha-Aminoxy-bis[dodeca(ethylene glycol)]-tris(omega-methoxy-undeca(ethylene glycol))
FORMULA: $C_{136}H_{270}N_6O_{66}$
MOLECULAR WEIGHT: 3045,60 g/mole



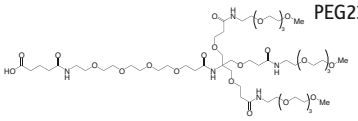
For aldehyde containing PEGs see p. 137f.

Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price

PEG2305 HOOC-PEG(4)-[PEG(4)-OMe]$_3$

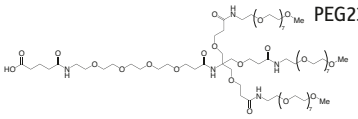
Carboxy-PEG(4)-[PEG(4)-OMe]$_3$
CAS-NO: 1333154-71-4
FORMULA: $C_{56}H_{107}N_5O_{26}$
MOLECULAR WEIGHT: 1266,47 g/mole
FURTHER INFORMATION: Spacer length 43 atoms or 28 A



PEG2305.0100	100 mg	€	325,00
PEG2305.0001	1 g	€	1475,00

PEG2325 HOOC-PEG(4)-[PEG(8)-OMe]$_3$

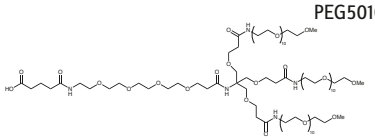
Carboxy-PEG(4)-[PEG(8)-OMe]$_3$
FORMULA: $C_{80}H_{155}N_5O_{38}$
MOLECULAR WEIGHT: 1795,1 g/mole
FURTHER INFORMATION: Spacer length 55 atoms or 60.2 A



PEG2325.0100	100 mg	€	325,00
PEG2325.0001	1 g	€	1475,00

PEG5010 HOOC-PEG(4)-[PEG(11)-OMe]$_3$

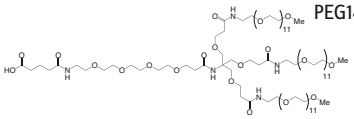
Carboxy-PEG(4)-[mPEG(11)]$_3$
FORMULA: $C_{98}H_{191}N_5O_{47}$
MOLECULAR WEIGHT: 2191,57 g/mole
FURTHER INFORMATION: Spacer length 55 atoms or 57 A



PEG5010.0100	100 mg	€	325,00
PEG5010.1000	1 g	€	1450,00

PEG1490 HOOC-dPEG(4)-[PEG(12)-OMe]$_3$

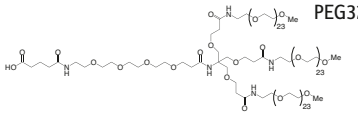
Carboxy-PEG(4)-[PEG(12)-OMe]$_3$
CAS-NO: 1334178-04-9
FORMULA: $C_{104}H_{203}N_5O_{50}$
MOLECULAR WEIGHT: 2323,73 g/mole
FURTHER INFORMATION: Spacer length 66 atoms or 74.1 A



PEG1490.0100	100 mg	€	325,00
PEG1490.0001	1 g	€	1475,00

PEG3240 HOOC-PEG(4)-[PEG(24)-OMe]$_3$

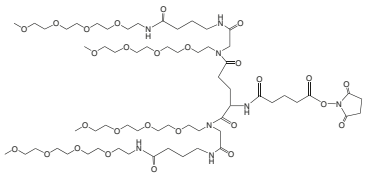
Carboxyl-PEG(4)-[PEG(24)-OMe]$_3$
CAS-NO: 1334178-04-9
FORMULA: $C_{176}H_{347}N_5O_{86}$
MOLECULAR WEIGHT: 3909,62 g/mole
FURTHER INFORMATION: Spacer length 103 atoms or 107.1 A



PEG3240.0100	100 mg	€	455,00
PEG3240.1000	1 g	€	1800,00

PEG0183 NHS-[PEG(4)]$_4$

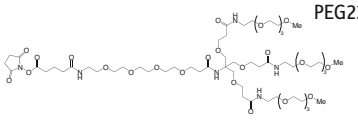
2,5-dioxopyrrolidin-1-yl 26-((15,20-dioxo-2,5,8,11-tetraoxa-14,19-diazahenicosan-21-yl)(2,5,8,11-tetraoxatridecan-13-yl)carbamoyl)-15,20,23,28-tetraoxo-22-(2,5,8,11-tetraoxatridecan-13-yl)-2,5,8,11-tetraoxa-14,19,22,27-tetraazadotriacontan-32-oate
FORMULA: $C_{62}H_{112}N_8O_{27}$
MOLECULAR WEIGHT: 1401,59 g/mole



please inquire!

PEG2300 NHS-PEG(4)-[PEG(4)-OMe]$_3$

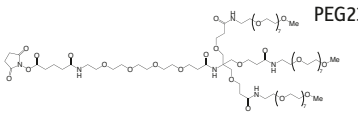
Succinimidyl-PEG(4)-[PEG(4)-OMe]$_3$
CAS-NO: 1333154-70-3
FORMULA: $C_{60}H_{110}N_6O_{28}$
MOLECULAR WEIGHT: 1363,54 g/mole
FURTHER INFORMATION: Spacer length 43 atoms or 46.2 A



PEG2300.0100	100 mg	€	325,00
PEG2300.0001	1 g	€	1475,00

PEG2320 NHS-PEG(4)-[PEG(8)-OMe]$_3$

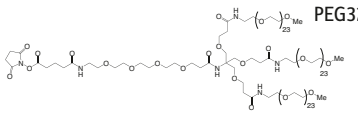
Succinimidyl-PEG(4)-[PEG(8)-OMe]$_3$
CAS-NO: 1333154-74-7
FORMULA: $C_{84}H_{158}N_6O_{40}$
MOLECULAR WEIGHT: 1892,17 g/mole
FURTHER INFORMATION: Spacer length 55 atoms or 60.2 A



PEG2320.0100	100 mg	€	325,00
PEG2320.0001	1 g	€	1475,00

PEG3230 NHS-PEG(4)-[PEG(24)-OMe]$_3$

Succinimidyl-PEG(4)-[PEG(24)-OMe]$_3$
CAS-NO: 1334178-03-8
FORMULA: $C_{180}H_{350}N_6O_{88}$
MOLECULAR WEIGHT: 4006,69 g/mole
FURTHER INFORMATION: Spacer length 103 atoms or 107.1 A

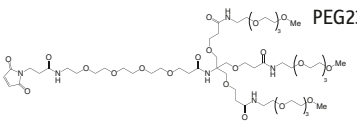


PEG3230.0100	100 mg	€	455,00
PEG3230.1000	1 g	€	1800,00

Prices are in EUR, net, exw Germany

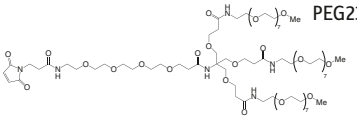
		Article No.	Quantity	Price
PEG2310	**mal-PEG(4)-[PEG(4)-OMe]$_3$**	PEG2310.0100	100 mg	€ 325,00
		PEG2310.0001	1 g	€ 1475,00

Maleimido-PEG(4)-[PEG(4)-OMe]$_3$
CAS-NO: 1333154-72-5
FORMULA: $C_{58}H_{106}N_6O_{26}$
MOLECULAR WEIGHT: 1303,49 g/mole
FURTHER INFORMATION: Spacer length 43 atoms or 47.9 A



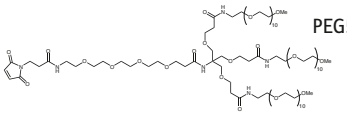
		Article No.	Quantity	Price
PEG2340	**mal-PEG(4)-[PEG(8)-OMe]$_3$**	PEG2340.0100	100 mg	€ 325,00
		PEG2340.0001	1 g	€ 1475,00

Maleimido-PEG(4)-[PEG(8)-OMe]$_3$
CAS-NO: 1334179-89-3
FORMULA: $C_{82}H_{154}N_6O_{38}$
MOLECULAR WEIGHT: 1832,12 g/mole
FURTHER INFORMATION: Spacer length 55 atoms or 61.9 A



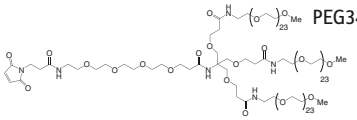
		Article No.	Quantity	Price
PEG5040	**mal-PEG(4)-[mPEG(11)]$_3$**	PEG5040.0100	100 mg	€ 325,00
		PEG5040.1000	1 g	€ 1450,00

Maleimidyl-PEG(4)-[PEG(10)-OMe]$_3$
FORMULA: $C_{100}H_{190}N_6O_{47}$
MOLECULAR WEIGHT: 2228,59 g/mole
FURTHER INFORMATION: Spacer length 64 atoms or 75.8 A



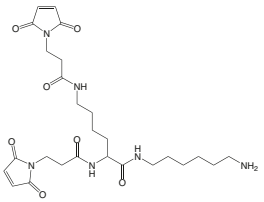
		Article No.	Quantity	Price
PEG3420	**mal-PEG(4)-[PEG(24)-OMe]$_3$**	PEG3420.0100	100 mg	€ 455,00
		PEG3420.1000	1 g	€ 1800,00

Maleimido-PEG(4)-[PEG(24)-OMe]$_3$ ester
CAS-NO: 1334178-05-0
FORMULA: $C_{178}H_{346}N_6O_{86}$
MOLECULAR WEIGHT: 3946.64 g/mole
FURTHER INFORMATION: Spacer length 103 atoms or 108.3 A



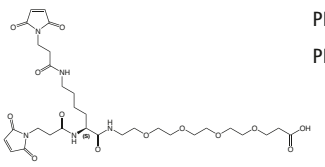
		Article No.	Quantity	Price
PEG1480	**Bis-mal-Oc-NH$_2$*TFA**	PEG1480.0100	100 mg	€ 295,00
		PEG1480.0001	1 g	€ 860,00

N,N'-(6-(6-aminohexylamino)-6-oxohexane-1,5-diyl)bis(3-maleimido-propanamide)
CAS-NO: 1301738-40-8
FORMULA: $C_{26}H_{38}N_6O_7$*CF_3CO_2H
MOLECULAR WEIGHT: 546,62*114,02 g/mole
FURTHER INFORMATION: Spacer length 17 or 21 atoms or 19.1 or 19.6 A resp.



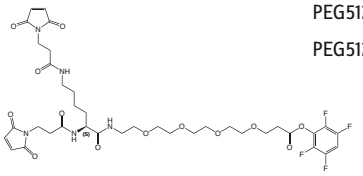
		Article No.	Quantity	Price
PEG5110	**Mal-L-Lys(Mal)-dPEG™(4)-COOH**	PEG5110.0100	100 mg	€ 295,00
		PEG5110.1000	1 g	€ 1200,00

15-(N-alpha,N-epsilon-Bis(3-(maleimido)propionyl)-L-lysinyl-amino)-4,7,10,13-tetraoxa-pentadecanoic acid
FORMULA: $C_{31}H_{45}N_5O_{13}$
MOLECULAR WEIGHT: 695,71 g/mole
FURTHER INFORMATION: Spacer are 25 and 29 atoms or 17.5 A and 27.9 A



		Article No.	Quantity	Price
PEG5120	**Mal-L-Lys(Mal)-dPEG™(4)-TFP**	PEG5120.0250	250 mg	€ 325,00
		PEG5120.1000	1 g	€ 1425,00

2,3,5,6-Tetrafluorophenyl 15-(N-alpha,N-epsilon-bis(3-(maleimido) propionyl)-L-lysinyl-amino)-4,7,10,13-tetraoxa-pentadecanoate
FORMULA: $C_{37}H_{45}F_4N_5O_{13}$
MOLECULAR WEIGHT: 843,77 g/mole
FURTHER INFORMATION: Spacer length 25 and 29 atoms or 17.5 A and 27.9 A

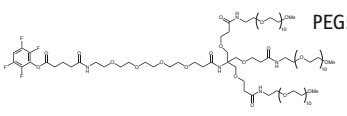


Reference:

- Mono PEGylated Dimeric Exendine-4 as High Receptor Binding and Long-Acting Conjugates for Type 2 Anti-Diabetes Therapeutics. Tae Hyung Kim, Hai Hua Jiang, Seulki Lee, Yu Seock Youn, Chan Woong Park, Youngro Byun, Xiayuan Chen, and Kang Choon Lee; *Bioconjugate Chem* 2011; **22(4)**: 625-632. DOI: 10.1021/bc100404x.
- Reorienting the Fab Domains of Trastuzumab Results in Potent HER2 Activators. Justin M. Scheer, Wendy Sandoval, J. Michael Elliott, Lily Shao, Elizabeth Luis, Sock-Cheng Lewin-Koh, Gabriele Schaefer, Richard Vandlen; *PLOS ONE* 2012; **7(12)**: e51817. DOI: 10.1371/journal.pone.0051817.

		Article No.	Quantity	Price
PEG5030	**TFP-PEG(4)-[mPEG(11)]$_3$**	PEG5030.0100	100 mg	€ 325,00
		PEG5030.1000	1 g	€ 1450,00

Tetrafluorphenyl carboxylate-PEG(4)-[PEG(10)-OMe]$_3$
FORMULA: $C_{104}H_{191}F_4N_5O_{47}$
MOLECULAR WEIGHT: 2339,63 g/mole
FURTHER INFORMATION: Spacer length 63 atoms or 74.1 A

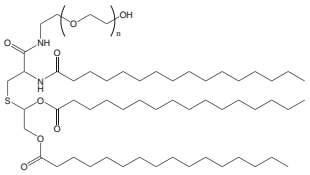


Prices are in EUR, net, exw Germany

PEG-fatty acid derivatives: water soluble adjuvants

PEG0306 Palm$_3$-Cys-PEG-OH

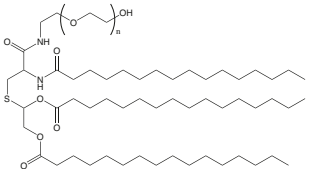
alpha-[(O,O'-N-Trispalmitoyl)-2-amino-5,6-dihydroxy-4-thia-hexanoylamido]-omega-hydroxy poly(ethylene glycol) (PEG-MW 3.000 Dalton)
MOLECULAR WEIGHT: 3000 Da
FURTHER INFORMATION: PEG-fatty acid conjugates, which are water soluble adjuvants.



Article No.	Quantity	Price
PEG0306.0005	5 mg	€ 100,00
PEG0306.0025	25 mg	€ 250,00
PEG0306.0100	100 mg	€ 400,00

PEG0506 Palm$_3$-Cys-PEG-OH

alpha-[(O,O'-N-Trispalmitoyl)-2-amino-5,6-dihydroxy-4-thia-hexanoylamido]-omega-hydroxy poly(ethylene glycol) (PEG-MW 5.000 Dalton)
MOLECULAR WEIGHT: 5000 Da
FURTHER INFORMATION: PEG-fatty acid conjugates, which are water soluble adjuvants.



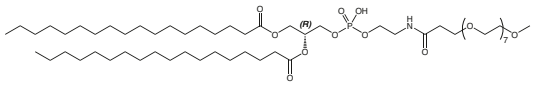
Article No.	Quantity	Price
PEG0506.0005	5 mg	€ 100,00
PEG0506.0025	25 mg	€ 250,00
PEG0506.0100	100 mg	€ 400,00

References:

- W. Rapp, L. Zhang, A. G. Beck-Sickinger, K. Dares, K.-H. Wiesmüller, G. Jung and E. Bayer, in *Peptides 1990: Proceedings of the 21st European Peptide Symposium*, E. Giralt and D. Andreu (Eds.). *ESCOM*; Leiden 1991, 849.
- Novel low-molecular-weight synthetic vaccine against foot-and-mouth disease containing a potent B-cell and macrophage activator; K.-H. Wiesmüller, G. Jung and G. Hess; *Vaccine* 1989; **7**: 29-33. doi:10.1016/0264-410X(89)90007-8
- Two-Dimensional Structure of β-Amyloid(10-35) Fibrils†; T. L. S. Benzinger, D. M. Gregory, T. S. Burkoth, H. Miller-Auer, D. G. Lynn, R. E. Botto and S. C. Meredith; *Biochemistry* 2000; **39**: 3491-3499. doi:10.1021/bi991527v
- Immunization and affinity purification of antibodies using resin-immobilized lysine-branched synthetic peptides; S. Butz, S. Rawer, W. Rapp and U. Birsner; *Pept Res* 1994; **7**: 20-3.
- Lipopeptide-Polyoxyethylene Conjugates as Mitogens and Adjuvants; B. Kleine, W. Rapp, K.-H. Wiesmüller, M. Edinger, W. Beck, J. Metzger, R. Ataulakhanov, G. Jung and W. G. Bessler; *Immunobiology* 1994; **190**: 53-66. doi:10.1016/S0171-2985(11)80283-4
- W. Rapp, L. Zhang, C. Müller, F.Zühl, K.-H. Wiesmüller, G. Jung and E. Bayer, in Innovations and Perspectives in Solid Phase Synthesis, Peptides, Proteins and Nucleic Acids, *Proceedings of the 3rd International Symposium* 1993, R. Epton (Ed.). *Mayflower Worldwide Ltd.*; Birmingham, 1994; 197.

PEG5210 MeO-dPEG™(8)-DSPE

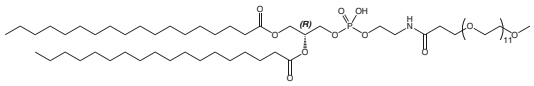
(2R)-3-((hydroxy(26-oxo-2,5,8,11,14,17,20,23-octaoxa-27-azanonacosan-29-yl)oxy)phosphoryl)oxy)propane-1,2-diyl distearate
FORMULA: $C_{59}H_{116}NO_{17}P$
MOLECULAR WEIGHT: 1142.52 g/mole
FURTHER INFORMATION: Spacer length 26 atoms or 29.8A



Article No.	Quantity	Price
PEG5210.0025	25 mg	€ 200,00
PEG5210.0100	100 mg	€ 325,00

PEG5190 MeO-dPEG™(12)-DSPE

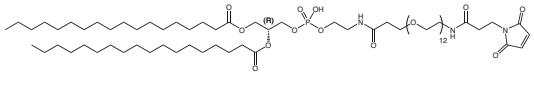
(2R)-3-((hydroxy(38-oxo-2,5,8,11,14,17,20,23,26,29,32,35-dodecaoxa-39-azahentetracontan-41-yl)oxy)phosphoryl)oxy)propane-1,2-diyl distearate
FORMULA: $C_{67}H_{132}NO_{21}P$
MOLECULAR WEIGHT: 1318.73 g/mole
FURTHER INFORMATION: Spacer length 38 atoms or 44A



Article No.	Quantity	Price
PEG5190.0025	25 mg	€ 200,00
PEG5190.0100	100 mg	€ 325,00

PEG5220 Mal-dPEG™(12)-DSPE

(2R)-3-((((46-(2,5-dioxo-2,5-dihydro-1H-pyrrol-1-yl)-4,44-dioxo-7,10,13,16,19,22,25,28,31,34,37,40-dodecaoxa-3,43-diazahexatetracontyl)oxy)(hydroxy)phosphoryl)oxy)propane-1,2-diyl distearate
FORMULA: $C_{75}H_{140}N_3O_{24}P$
MOLECULAR WEIGHT: 1498,89 g/mole
FURTHER INFORMATION: Spacer length 46 atoms or 53.3A



Article No.	Quantity	Price
PEG5220.0025	25 mg	€ 325,00
PEG5220.0100	100 mg	€ 695,00

Other PEG-fatty acid derivatives on custom synthesis basis.

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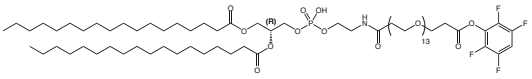
	Article No.	Quantity	Price
PEG5230 Tfp-dPEG™(13)-DSPE	PEG5230.0025	25 mg	€ 200,00
	PEG5230.0100	100 mg	€ 515,00

(2R)-3-((((4,46-dioxo-46-(2,3,5,6-tetrafluorophenoxy)-7,10,13,16,19,22,25,28,31,34,37,40,43-tridecaoxa-3-azahexatetracontyl)oxy)(hydroxy)phosphoryl)oxy)propane-1,2-diyl distearate

FORMULA: $C_{77}H_{138}F_4NO_{24}P$

MOLECULAR WEIGHT: 1568,88 g/mole

FURTHER INFORMATION: Spacer length 43 atoms or 50.0A



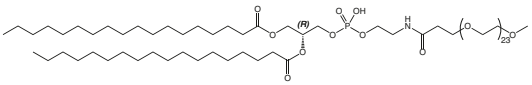
	Article No.	Quantity	Price
PEG5200 MeO-dPEG™(24)-DSPE	PEG5200.0025	25 mg	€ 200,00
	PEG5200.0100	100 mg	€ 325,00

(2R)-3-((hydroxy(74-oxo-2,5,8,11,14,17,20,23,26,29,32,35,38,41,44,47,50,53,56,59,62,65,68,71-tetracosaoxa-75-azaheptaheptacontan-77-yl)oxy)phosphoryl)oxy)propane-1,2-diyl distearate

FORMULA: $C_{91}H_{180}NO_{33}P$

MOLECULAR WEIGHT: 1874.36 g/mole

FURTHER INFORMATION: Spacer length 74 atoms or 86.2A



3.2 Amino-PEG-Acids and Active Esters

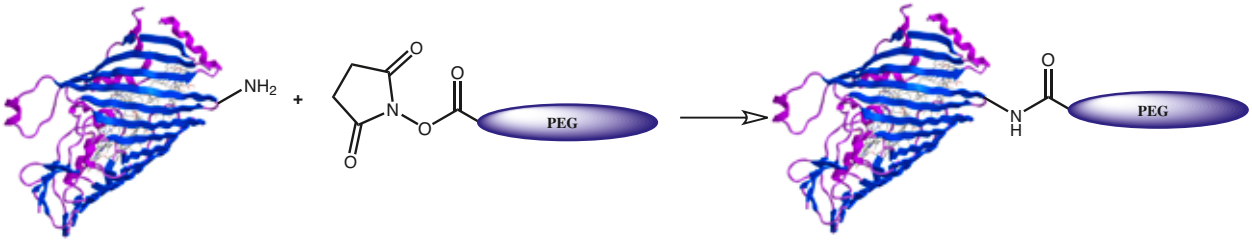
PEGylation modification with PEG carboxylic acids or PEG active esters is useful for improving water solubility, increasing chemical stability, decreasing aggregation and toxicity, and reduction of immunogenicity.

Amino protected amino-PEG-acids can be used for the PEGylation of solid particles in order to create hydrophilic and reactive surfaces with no non-specific binding issues.

The amount of the PEG-NHS ester used in the modification reaction is potentially going to depend on several variables, including:

- the modification application, e.g., solution or surface, organic or aqueous, large biological or small organic,
- the concentration of the specific reactive amines available for reaction, as well as
- the desired effect from the PEG which is incorporated.

In this latter case, choosing the proper length of the PEG will be important. This may involve experimenting with different lengthes as well as tribranched compounds. Therefore, these variables need to be taken into consideration before a basic optimization experiment is designed and run.



Protocol for the Conjugation of Active Esters:

a) For aqueous based modifications the reaction can be run in an amine-free buffer at pH 7-8. The PEG NHS ester can be added as a stock solution in a dry organic solvent such as DMAC, DMSO or DMF. This stock solution can be stored for several months frozen at -20°C if care is taken to exclude moisture in the preparation and handling of the NHS ester. The calculated amount of stock is added to the aqueous reactant solution and the reaction will be complete in about 30 minutes to about 2 hours, depending on the specific stoichiometry of the reaction and the desired extent of reaction. The half-life of the NHS ester depends on temperature, pH and structure, i.e. reactivity of the active ester (see table next page). Use your established methods to monitor the reaction.

b) For organic based modifications, standard organic procedures may be used, generally adding a solution of the PEG NHS ester to a solution of the reactant containing a tertiary amine, e.g. Hünig's base, triethylamine or DBU. Homogeneous reactions are typically monitored by TLC or HPLC. Where possible, methylene chloride as the reaction solvent is recommended which also greatly facilitates the work-up. If the solubility of the compound to be modified will not allow this, other appropriate solvents like DMF or DMAC may be used. Optionally, the reaction can be run as slurry and the reaction will draw the reactants into solution, as the incorporated PEG will significantly increase the solubility in many organic solvents, in particular in methylene chloride.

Prices are in EUR, net, exw Germany

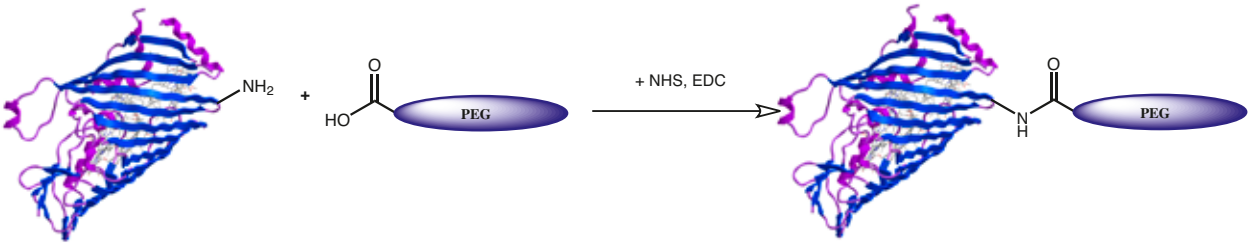
Reactivity of PEG NHS Active Esters towards Aminolysis* at 25°C:

Structure of the Active Ester	Corresponding Acid	$t_{1/2}$ [min] pH 8	pH 7**	pH 6**
PEG-O-$CH_2CH_2CH_2$-CO_2-NHS	Butyric acid	23.3	70	210
PEG-O-CO_2-NHS	Carbonate	20.4	61	183
PEG-O_2C-CH_2-CH_2-CH_2-CO_2-NHS	Glutaric acid	17.6	53	159
PEG-O-CH_2CH_2-CO_2-NHS	Propionic acid	16.5	49	147
PEG-S-CH_2-CH_2-CO_2-NHS	Mercaptopropionic acid	10.7	32	96
PEG-O_2C-CH_2CH_2-CO_2-NHS	Succinic acid	9.8	29	87
PEG-NH-CO-CH_2CH_2-CO_2-NHS	Succinamic acid	3.2	9	27
PEG-O-CH_2-CO_2-NHS	Acetic acid	0.75	2.25	6.75

* The relative reactivity of hydrolysis compared to aminolysis shows the same series, however, hydrolysis is much slower.

** calculated on basis of the data of pH 8.

PEG acids can be activated in situ using standard activation methods, e.g., with EDC and NHS in methylene chloride:



Protocol for in-situ Activation to the NHS ester:

Add a methylene chloride solution of the acid to the dry reagents under dry conditions (10-20% molar excess of EDC and NHS in dry methylene chloride, dried over 3A molecular sieves). Stir for several hours or overnight, then evaporate the solvent and use. The reaction mixture can also be treated with a small amount of silica gel to adsorb excess EDC and urea by-product. Filter, then evaporate the solvent and use.

NHS should be added together with EDC to prevent formation of an anhydride. DCC and DIC can also be used. Typically use about 1 equivalent and add a solution of the carbodiimide to the acid and NHS (1.1 to 1.2 eq.). PfOH (pentafluorophenol), MSNT (1-(Mesitylene-2-sulfonyl)-3-nitro-1,2,4-triazole), HOCt (Ethyl 1-hydroxy-1H-1,2,3-Triazole-4-carboxylate), HOPO (2-Hydroxypyridine-N-oxide) and a set of other coupling reagents/leaving groups can be used in place of NHS, if this is of any preference.

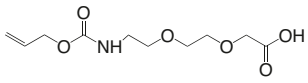
Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; **Ch. 18**: 711-742; ISBN 978-0-12-370501-3

3.2.1 Aloc Protected Amino-PEG-Acids

AAA1905 Aloc-O2Oc-OH*DCHA

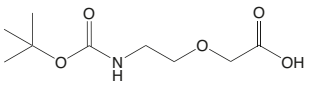
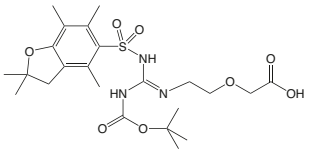
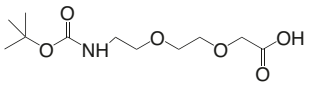
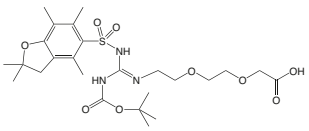
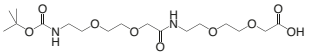
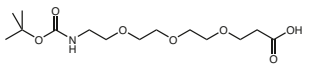
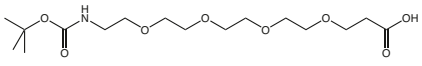
8-(Allyloxycarbonyl-amino)-3,6-dioxaoctanoic acid dicyclohexylamine
CAS-NO: 560088-74-6
FORMULA: $C_{10}H_{17}NO_6*C_{12}H_{23}N$
MOLECULAR WEIGHT: 247,11*181,32 g/mole



Article No.	Quantity	Price
AAA1905.0001	1 g	€ 80,00
AAA1905.0005	5 g	€ 300,00
AAA1905.0025	25 g	€ 1200,00

Prices are in EUR, net, exw Germany

3.2.2 Boc Protected Amino-PEG-Acids

		Article No.	Quantity	Price
BAA5240 Boc-O1Pen-OH*DCHA 5-(t-Butyloxycarbonyl-amino)-3-oxapentanoic acid CAS-NO: 142929-49-5 net FORMULA: $C_9H_{17}NO_5*C_{12}H_{23}N$ MOLECULAR WEIGHT: 219,24*181,32 g/mole		BAA5240.0005 BAA5240.0025	5 g 25 g	€ 240,00 € 950,00
BAA6070 Boc,Pbf-amidino-O1Pen-OH 5-[N-t-Butyloxycarbonyl-N'-(2,2,4,6,7-pentamethyldihydrobenzo-furan-5-sulfonyl)]amidino-3-oxapentanoic acid CAS-NO: 1263049-05-3 FORMULA: $C_{23}H_{35}N_3O_8S$ MOLECULAR WEIGHT: 513,61 g/mole		BAA6070.0001 BAA6070.0005 BAA6070.0025	1 g 5 g 25 g	€ 85,00 € 300,00 € 1200,00
BAA1466 Boc-O2Oc-OH*DCHA 8-(t-Butyloxycarbonyl-amino)-3,6-dioxaoctanoic acid CAS-NO: 560088-79-1 FORMULA: $C_{11}H_{21}NO_6*C_{12}H_{23}N$ MOLECULAR WEIGHT: 263,29*181,32 g/mole		BAA1466.0005 BAA1466.0025	5 g 25 g	€ 200,00 € 800,00
BAA6080 Boc,Pbf-amidino-O2Oc-OH 8-[N-t-Butyloxycarbonyl-N'-(2,2,4,6,7-pentamethyldihydrobenzo-furan-5-sulfonyl)]amidino-3,6-dioxaoctanoic acid CAS-NO: 1263049-06-4 FORMULA: $C_{25}H_{39}N_3O_9S$ MOLECULAR WEIGHT: 557,66 g/mole		BAA6080.0001 BAA6080.0005 BAA6080.0025	1 g 5 g 25 g	€ 85,00 € 300,00 € 1200,00
BAA1485 Boc-O2Oc-O2Oc-OH 17-(t-Butyloxycarbonyl-amino)-9-aza-3,6,12,15-tetraoxa-10-on-heptadecanoic acid CAS-NO: 1069067-08-8 FORMULA: $C_{17}H_{32}N_2O_9$ MOLECULAR WEIGHT: 408,45 g/mole		BAA1485.0001 BAA1485.0005 BAA1485.0025	1 g 5 g 25 g	€ 150,00 € 500,00 € 2000,00
PEG4930 Boc-NH-PEG(3)-COOH 1-(t-Butyloxycarbonyl)amino-3,6,9-trioxadodecan-12-oic acid FORMULA: $C_{14}H_{27}NO_7$ MOLECULAR WEIGHT: 321,37 g/mole		PEG4930.0001 PEG4930.0005 PEG4930.0025	1 g 5 g 25 g	€ 200,00 € 700,00 € 2800,00
PEG1920 Boc-NH-dPEG(4)-COOH 15-t-Butyloxycarbonylamino-4,7,10,13-tetraoxa-pentadecanoic acid CAS-NO: 756525-91-4 FORMULA: $C_{16}H_{31}NO_8$ MOLECULAR WEIGHT: 365,42 g/mole FURTHER INFORMATION: Spacer length 17 atoms or 19.2 A		PEG1920.0001 PEG1920.0005	1 g 5 g	€ 225,00 € 900,00

The general application of the following heterobifunctional crosslinker **(NHS-dPEG™(4)-NHNH-Boc)** is to react in a first step with its NHS function with an amine-containing target, followed by conjugating with a carbonyl containing complementary target molecule after the Boc hydrazide has been deprotected with either TFA or HCl.

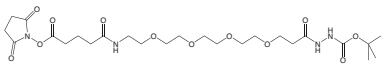
Many biological molecules contain the amine function - or can have it incorporated - and the same can be said for the carbonyl moiety, in small molecule drugs, as well as peptides, oligonucleotides or other complementary biologicals.

The main advantage of PEG containing heterobifunctional crosslinkers over conventional hydrophobic methylene spacers is that PEG spacers are very hydrophilic/ water soluble and non-immunogenic spacers. These properties also can work to eliminate aggregation issues often encountered.

Prices are in EUR, net, exw Germany

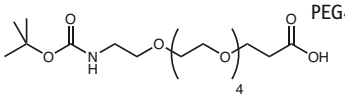
	Article No.	Quantity	Price
PEG1855 NHS-dPEG(4)-NHNH-Boc	PEG1855.0100	100 mg	€ 265,00
	PEG1855.0001	1 g	€ 1150,00

1-(N'-t-Butyloxycarbonyl)hydrazido-1,17-dioxo-4,7,10,13-tetraoxa-16-azahenicosan-21-oic acid succinimidyl ester
CAS-NO: 1203507-50-9
FORMULA: $C_{25}H_{42}N_4O_{12}$
MOLECULAR WEIGHT: 590,62 g/mole
FURTHER INFORMATION: Spacer length 23 atoms or 27.7 A



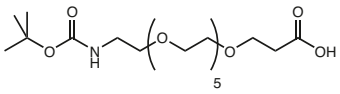
PEG4920 Boc-NH-PEG(5)-COOH	PEG4920.0001	1 g	€ 325,00
	PEG4920.0005	5 g	€ 1250,00

1-(t-Butyloxycarbonyl)amino-3,6,9,12,15-pentaoxaoctadecan-18-oic acid
FORMULA: $C_{18}H_{35}NO_9$
MOLECULAR WEIGHT: 409,47 g/mole



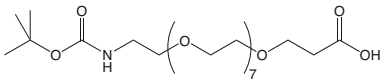
PEG4910 Boc-NH-PEG(6)-COOH	PEG4910.0001	1 g	€ 325,00
	PEG4910.0005	5 g	€ 1250,00

1-(t-Butyloxycarbonyl)amino-3,6,9,12,15,18-hexaoxahenicosan-21-oic acid
CAS-NO: 882847-13-4
FORMULA: $C_{20}H_{39}NO_{10}$
MOLECULAR WEIGHT: 453,52 g/mole



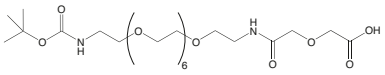
PEG2410 Boc-NH-PEG(8)-COOH	PEG2410.0100	100 mg	€ 225,00
	PEG2410.0001	1 g	€ 750,00

alpha-t-Butyloxycarbonylamino-omega-carboxy octa(ethylene glycol)
CAS-NO: 1334169-93-5
FORMULA: $C_{24}H_{47}NO_{12}$
MOLECULAR WEIGHT: 541,63 g/mole
FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A



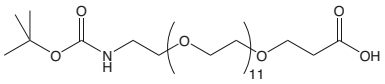
PEG1071 Boc-NH-PEG(8)-COOH	PEG1071.0001	1 g	€ 575,00
	PEG1071.0005	5 g	€ 1975,00

alpha-t-Butyloxycarbonylamino-omega-diglycolic acid octa(ethylene glycol)
FORMULA: $C_{25}H_{48}N_2O_{13}$
MOLECULAR WEIGHT: 584,67 g/mole



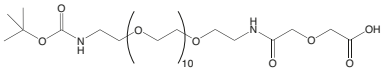
PEG2415 Boc-NH-PEG(12)-COOH	PEG2415.0100	100 mg	€ 235,00
	PEG2415.0001	1 g	€ 825,00

alpha-t-Butyloxycarbonylamino-omega-carboxy dodeca(ethylene glycol)
CAS-NO: 187848-68-6
FORMULA: $C_{32}H_{63}NO_{16}$
MOLECULAR WEIGHT: 717,84 g/mole
FURTHER INFORMATION: Spacer length 40 atoms or 46.4 A



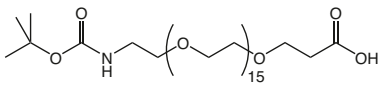
PEG1070 Boc-NH-PEG(12)-COOH	PEG1070.0001	1 g	€ 575,00
	PEG1070.0005	5 g	€ 1975,00

alpha-t-Butyloxycarbonylamino-omega-[(aminocarboxymethoxy) acetic acid] dodecae(ethylene glycol)
FORMULA: $C_{33}H_{64}N_2O_{17}$
MOLECULAR WEIGHT: 760,88 g/mole



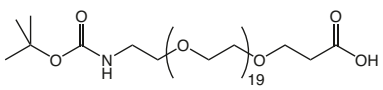
PEG4460 Boc-NH-dPEG™(16)-COOH	please inquire!		

alpha-t-Butyloxycarbonylamino-omega-carboxy hexadeca(ethylene glycol)
CAS-NO: 187848-68-6
FORMULA: $C_{40}H_{79}NO_{20}$
MOLECULAR WEIGHT: 894,05 g/mole
FURTHER INFORMATION: Spacer length 51 atoms or 60.7 A



PEG4470 Boc-NH-dPEG™(20)-COOH	please inquire!		

alpha-t-Butyloxycarbonylamino-omega-carboxy 20(ethylene glycol)
CAS-NO: 187848-68-6
FORMULA: $C_{48}H_{95}NO_{24}$
MOLECULAR WEIGHT: 1070,26 g/mole
FURTHER INFORMATION: Spacer length 75.2 atoms or 64 A



Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG4480	**Boc-NH-dPEG™(24)-COOH** alpha-t-Butyloxycarbonylamino-omega-carboxy 24(ethylene glycol) CAS-NO: 187848-68-6 FORMULA: $C_{56}H_{111}NO_{28}$ MOLECULAR WEIGHT: 1246,47 g/mole FURTHER INFORMATION: Spacer length 76 atoms or 89.0 A	PEG4480.0100	100 mg	€ 325,00
		PEG4480.1000	1 g	€ 1100,00
PEG1995	**Boc-NH-PEG(27)-COOH** alpha-t-Butyloxycarbonylamino-27(ethylene glycol)-omega-propionic acid FORMULA: $C_{64}H_{127}NO_{32}$ MOLECULAR WEIGHT: 1422,71 g/mole	PEG1995.0001	1 g	€ 850,00
		PEG1995.0005	5 g	€ 2900,00
PEG4490	**Boc-NH-dPEG™(36)-COOH** alpha-t-Butyloxycarbonylamino-omega-carboxy 36(ethylene glycol) CAS-NO: 187848-68-6 FORMULA: $C_{80}H_{159}NO_{40}$ MOLECULAR WEIGHT: 1775,1 g/mole FURTHER INFORMATION: Spacer length 111 atoms or 132.7 A	PEG4490.0100	100 mg	€ 385,00
		PEG4490.1000	1 g	€ 1350,00
PEG1073	**Boc-NH-PEG-COOH** alpha-t-Butyloxycarbonylamino-omega-carboxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG1073.0500	500 mg	€ 180,00
		PEG1073.0001	1 g	€ 280,00
		PEG1073.0005	5 g	€ 1150,00
PEG1074	**Boc-NH-PEG-COOH** alpha-t-Butyloxycarbonylamino-omega-carboxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG1074.0500	500 mg	€ 180,00
		PEG1074.0001	1 g	€ 280,00
PEG1072	**Boc-NH-PEG-COOH** alpha-t-Butyloxycarbonylamino-omega-carboxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG1072.0500	500 mg	€ 230,00
		PEG1072.0001	1 g	€ 350,00
PEG1111	**Boc-NH-PEG-NHS** alpha-t-Butyloxycarbonylamino-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG1111.0500	500 mg	€ 225,00
		PEG1111.0001	1 g	€ 375,00
PEG1112	**Boc-NH-PEG-NHS** alpha-t-Butyloxycarbonylamino-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG1112.0500	500 mg	€ 225,00
		PEG1112.0001	1 g	€ 375,00
PEG1110	**Boc-NH-PEG-NHS** alpha-t-Butyloxycarbonylamino-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG1110.0500	500 mg	€ 275,00
		PEG1110.0001	1 g	€ 450,00

Need GMP production of PEGs? Please inquire!

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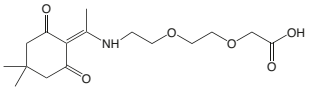
3.2.3 Dde Protected Amino-PEG-Acids

DAA1016 Dde-O2Oc-OH

8-[(4,4-Dimethyl-2,6-dioxocyclohex-1-ylidene)ethyl-amino]-3,6-dioxaoctanoic acid
FORMULA: $C_{16}H_{25}NO_6$
MOLECULAR WEIGHT: 327,37 g/mole



Article No.	Quantity	Price
DAA1016.0001	1 g	€ 125,00
DAA1016.0005	5 g	€ 450,00
DAA1016.0025	25 g	€ 1800,00

Dde Amino protected Compounds in Organic Synthesis

- The Dde-protecting group is stable to Boc- and Trt-cleavage reagents (TFA), to Fmoc deprotecting reagents (Piperidine or DBU) and also Pd(0) for Aloc/All removal.
- Dde can be removed with 2% hydrazine in DMF. However, in the presence of Aloc groups a partial reduction can occur [1]. In the presence of Fmoc groups these are readily deprotected! To selectively deprotect Dde in the presence of other protecting groups a mixture of NH_2OH*HCl/ Imidazole in NMP/DCM can be used [2].
- Dde-protected compounds are applied in solid-phase synthesis of peptides, polyamines and other compounds.
- Side reactions with the Dde-group and its suppression are published in [3].
- Suppressing side reactions with Aloc-group in the Dde-deprotection step can be found in [1].

Selective Deprotection Mixture according to Mark Bradley *et al.*:

1.25g (1.80 mmol) of NH_2OH*HCl and 0.92g (1.35 mmol) of imidazole are suspended in 5 mL NMP, and the mixture is sonicated until complete dissolution. This solution can be stored for at least 2 weeks at -20°C. Just before reaction, 5 volumes of this solution are diluted with 1 volume of alternatively DCM or DMF.

Published Applications:

- Mitsunobu alkylation with Dde-aminoalcohols; Dde-Tyr(ol) was noted as best protected derivative for the synthesis of chiral building blocks [4].
- Dde-Phe(ol) [5] and Dde-NH-$(CH_2)_3$-OH, Dde-NH-$(CH_2)_4$-OH [6] were also used in solid-phase N-alkylation under Mitsunobu condition.
- Solid Phase syntheses of Lys derivatives [7], peptides and mimetics [8-18].
- Oligonucleotide-peptide hybrid [19].
- Glycopeptidolipids with Dde-protection [20].
- Dde-protected cysteine derivatives are used for the synthesis of asymmetric cystines [21].

References:

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3.2.4 Dnp Protected Amino-PEG-Acids

Hapten-carrier for anti-DNP antibodies:

The DNP-PEGs can be used to label a carrier such as KLH for generating anti-DNP antibodies.

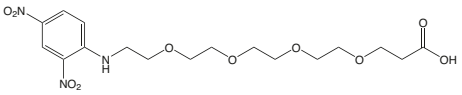
Reference:

▶ Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; **Ch. 19**; ISBN 978-0-12-370501-3

	Article No.	Quantity	Price
PEG2145 Dnp-NH-PEG(4)-COOH	PEG2145.0100	100 mg	€ 235,00
	PEG2145.0001	1 g	€ 1025,00
PEG2285 Dnp-NH-PEG(12)-COOH	PEG2285.0100	100 mg	€ 295,00
	PEG2285.0001	1 g	€ 1300,00
PEG2150 Dnp-NH-PEG(4)-NHS	PEG2150.0100	100 mg	€ 265,00
	PEG2150.0001	1 g	€ 1150,00
PEG2290 Dnp-NH-PEG(12)-NHS	PEG2290.0100	100 mg	€ 325,00
	PEG2290.0001	1 g	€ 1425,00

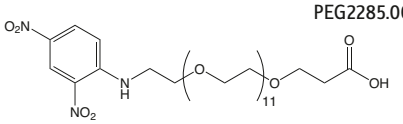
PEG2145 Dnp-NH-PEG(4)-COOH

1-(2,4-Dinitrophenylamino)-3,6,9,12-tetraoxapentadecanoic acid
CAS-NO: 858126-76-8
FORMULA: $C_{17}H_{25}N_3O_{10}$
MOLECULAR WEIGHT: 431,39 g/mole
FURTHER INFORMATION: Spacer length 16 atoms or 18.0 A



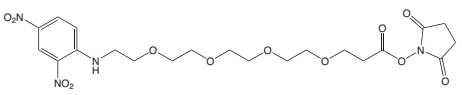
PEG2285 Dnp-NH-PEG(12)-COOH

alpha-(2,4-Dinitrophenyl)amino-omega-carboxy dodeca(ethylene glycol)
CAS-NO: 1334178-00-5
FORMULA: $C_{33}H_{57}N_3O_{18}$
MOLECULAR WEIGHT: 783,81 g/mole
FURTHER INFORMATION: Spacer length 45 atoms or 50 A



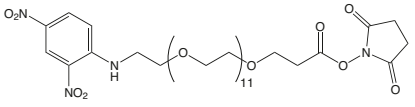
PEG2150 Dnp-NH-PEG(4)-NHS

1-(2,4-Dinitrophenylamino)-3,6,9,12-tetraoxapentadecanoic acid succinimidyl ester
CAS-NO: 858126-78-0
FORMULA: $C_{21}H_{28}N_4O_{12}$
MOLECULAR WEIGHT: 528,47 g/mole
FURTHER INFORMATION: Spacer length 16 atoms or 18.0 A



PEG2290 Dnp-NH-PEG(12)-NHS

alpha-(2,4-Dinitrophenyl)amino-omega-succinimidyl ester dodeca(ethylene glycol)
CAS-NO: 1334178-01-6
FORMULA: $C_{34}H_{60}N_4O_{20}$
MOLECULAR WEIGHT: 880,89 g/mole
FURTHER INFORMATION: Spacer length 40 atoms or 46.4 A



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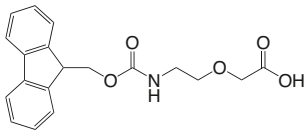
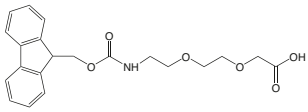
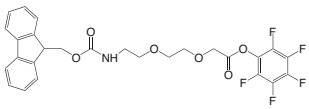
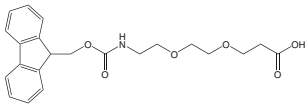
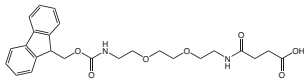
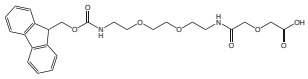
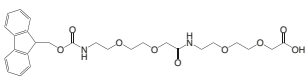
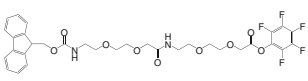
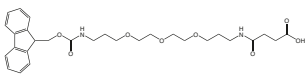
3.2.5 Fmoc Protected Amino-PEG-Acids

		Article No.	Quantity	Price
FAA1565	**Fmoc-O1Pen-OH**	FAA1565.0001	1 g	€ 50,00
5-(9-Fluorenylmethyloxycarbonyl-amino)-3-oxapentanoic acid CAS-NO: 260367-12-2 FORMULA: $C_{19}H_{19}NO_5$ MOLECULAR WEIGHT: 341,37 g/mole		FAA1565.0005	5 g	€ 200,00
		FAA1565.0025	25 g	€ 800,00
FAA1435	**Fmoc-O2Oc-OH**	FAA1435.0001	1 g	€ 85,00
8-(9-Fluorenylmethyloxycarbonyl-amino)-3,6-dioxaoctanoic acid CAS-NO: 166108-71-0 FORMULA: $C_{21}H_{23}NO_6$ MOLECULAR WEIGHT: 385,42 g/mole		FAA1435.0005	5 g	€ 200,00
		FAA1435.0025	25 g	€ 800,00
FAA6020	**Fmoc-O2Oc-OPfp**	FAA6020.0001	1 g	€ 150,00
8-(9-Fluorenylmethyloxycarbonyl-amino)-3,6-dioxaoctanoic acid pentafluorophenyl ester CAS-NO: 1263044-39-8 FORMULA: $C_{27}H_{22}F_5NO_6$ MOLECULAR WEIGHT: 551,5 g/mole		FAA6020.0005	5 g	€ 500,00
		FAA6020.0025	25 g	€ 2000,00
PEG1810	**Fmoc-AEEP**	PEG1810.0001	1 g	€ 160,00
3-(2-(2-(9-Fluorenylmethyloxycarbonyl)aminoethoxy)ethoxy)propanoic acid CAS-NO: 872679-70-4 FORMULA: $C_{22}H_{25}NO_6$ MOLECULAR WEIGHT: 399,44 g/mole FURTHER INFORMATION: Spacer length 10 atoms or 10.9 A		PEG1810.0005	5 g	€ 550,00
		PEG1810.0025	25 g	€ 1750,00
PEG4970	**Fmoc-Ebes**	PEG4970.0001	1 g	€ 95,00
N-[8-(9-Fluorenylmethyloxycarbonyl)amino-3,6-dioxaoctyl]succinamic acid CAS-NO: 613245-91-3 FORMULA: $C_{25}H_{30}N_2O_7$ MOLECULAR WEIGHT: 470,51 g/mole		PEG4970.0005	5 g	€ 350,00
		PEG4970.0025	25 g	€ 1400,00
PEG5180	**Fmoc-DOOA-DIG-OH**	PEG5180.0001	1 g	€ 145,00
2-(2-(2-(2-((9-Fluorenylmethyloxycarbonyl)amino)ethoxy)ethoxy)ethylamino)-diglycolic acid FORMULA: $C_{25}H_{30}N_2O_8$ MOLECULAR WEIGHT: 486,51 g/mole		PEG5180.0005	5 g	€ 450,00
		PEG5180.0025	25 g	€ 1800,00
FAA1787	**Fmoc-O2Oc-O2Oc-OH**	FAA1787.0001	1 g	€ 150,00
17-(9-Fluorenylmethyloxycarbonyl-amino)-9-aza-3,6,12,15-tetraoxa-10-on-heptadecanoic acid CAS-NO: 560088-89-3 FORMULA: $C_{27}H_{34}N_2O_9$ MOLECULAR WEIGHT: 530,58 g/mole		FAA1787.0005	5 g	€ 500,00
		FAA1787.0025	25 g	€ 2000,00
FAA6790	**Fmoc-O2Oc-O2Oc-OPfp**	FAA6790.0001	1 g	€ 300,00
17-(9-Fluorenylmethyloxycarbonyl-amino)-9-aza-3,6,12,15-tetraoxa-10-on-heptadecanoic acid pentafluorophenyl ester FORMULA: $C_{33}H_{33}F_5N_2O_9$ MOLECULAR WEIGHT: 696,61 g/mole		FAA6790.0005	5 g	€ 1200,00
FAA1568	**Fmoc-TTDS-OH**	FAA1568.0001	1 g	€ 100,00
[N1-(9-Fluorenylmethoxycarbonyl)-1,13-diamino-4,7,10-trioxatridecan-succinamic acid CAS-NO: 172089-14-4 FORMULA: $C_{29}H_{38}N_2O_8$ MOLECULAR WEIGHT: 542,63 g/mole		FAA1568.0005	5 g	€ 350,00
		FAA1568.0025	25 g	€ 1000,00

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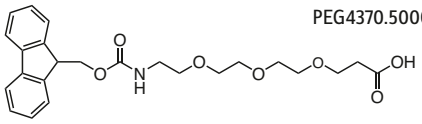
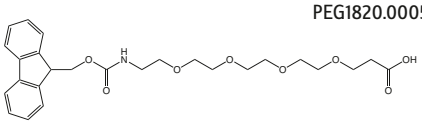
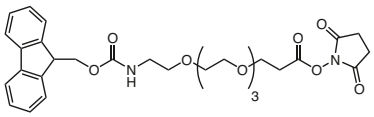
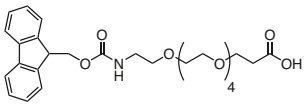
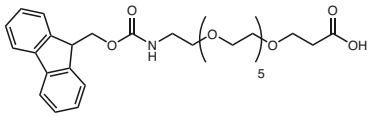
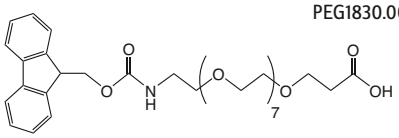
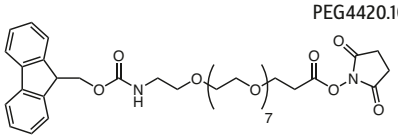
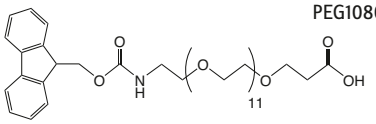
		Article No.	Quantity	Price
PEG4370	**Fmoc-NH-PEG(3)-COOH**	PEG4370.1000	1 g	€ 225,00
12-(9-Fluorenyloxycarbonylamino)-4,7,10-trioxa-dodecanoic acid CAS-NO: 867062-95-1 FORMULA: $C_{24}H_{29}NO_7$ MOLECULAR WEIGHT: 443,49 g/mole FURTHER INFORMATION: Spacer length 13 atoms or 14.4 A		PEG4370.5000	5 g	€ 900,00
PEG1820	**Fmoc-NH-dPEG(4)-COOH**	PEG1820.0001	1 g	€ 225,00
15-(9-Fluorenyloxycarbonyl)amino-4,7,10,13-tetraoxa-pentadecanoic acid CAS-NO: 557756-85-1 FORMULA: $C_{26}H_{33}NO_8$ MOLECULAR WEIGHT: 487,54 g/mole FURTHER INFORMATION: Spacer length 17 atoms or 18.1 A		PEG1820.0005	5 g	€ 800,00
PEG4410	**Fmoc-NH-dPEG™(4)-NHS**	PEG4410.0100	100 mg	€ 200,00
15-(9-Fluorenyloxycarbonyl)amino-4,7,10,13-tetraoxa-pentadecanoic acid succinimidyl ester CAS-NO: 1314378-14-7 FORMULA: $C_{30}H_{36}N_2O_{10}$ MOLECULAR WEIGHT: 584,24 g/mole FURTHER INFORMATION: Spacer length 17 atoms or 18.17 A		PEG4410.1000	1 g	€ 420,00
PEG4380	**Fmoc-NH-PEG(5)-COOH**	PEG4380.1000	1 g	€ 300,00
18-(9-Fluorenyloxycarbonylamino)-4,7,10, 13-tetraoxa-octadecanoic acid CAS-NO: 882847-32-7 FORMULA: $C_{28}H_{37}NO_9$ MOLECULAR WEIGHT: 531,59 g/mole FURTHER INFORMATION: Spacer length 19 atoms or 21.6 A		PEG4380.5000	5 g	€ 900,00
		PEG4380.9025	25 g	€ 4000,00
PEG1825	**Fmoc-NH-dPEG(6)-COOH**	PEG1825.0001	1 g	€ 300,00
1-(9-Fluorenylmethyloxycarbonyl)amino-3,6,9,12,15,18-hexaoxahenicosan-21-oic acid CAS-NO: 882847-34-9 FORMULA: $C_{30}H_{41}NO_{10}$ MOLECULAR WEIGHT: 575,65 g/mole FURTHER INFORMATION: Spacer length 22 atoms or 25.1 A		PEG1825.0005	5 g	€ 1200,00
PEG1830	**Fmoc-NH-dPEG(8)-COOH**	PEG1830.0100	100 mg	€ 225,00
1-(9-Fluorenylmethyloxycarbonyl)amino-3,6,9,12,15,18,21,24-octaoxaheptacosan-27-oic acid CAS-NO: 756526-02-0 FORMULA: $C_{34}H_{49}NO_{12}$ MOLECULAR WEIGHT: 663,75 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A		PEG1830.0001	1 g	€ 575,00
PEG4420	**Fmoc-NH-dPEG™(8)-NHS**	PEG4420.0100	100 mg	€ 235,00
alpha-(Fmoc-amino)-omega-(succinimidyl propionate) octa(ethylene glycol) CAS-NO: 1334170-03-4 FORMULA: $C_{38}H_{52}N_2O_{14}$ MOLECULAR WEIGHT: 760,82 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.7 A		PEG4420.1000	1 g	€ 775,00
PEG1080	**Fmoc-NH-PEG(12)-COOH**	PEG1080.0100	100 mg	€ 225,00
1-(9-Fluorenylmethyloxycarbonyl)amino-3,6,9,12,15,18,21,24,27,30,33,36-dodecaoxanonatriacontan-39-oic acid FORMULA: $C_{42}H_{65}NO_{16}$ MOLECULAR WEIGHT: 839,98 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 46.5 A		PEG1080.0001	1 g	€ 750,00

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	Article No.	Quantity	Price
PEG4430 Fmoc-NH-dPEG™(12)-NHS	PEG4430.0100	100 mg	€ 250,00
alpha-(Fmoc-amino)-omega-(succinimidyl propionate) dodeca(ethylene glycol) CAS-NO: 488085-18-3 FORMULA: $C_{46}H_{68}N_2O_{18}$ MOLECULAR WEIGHT: 937,03 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 46.5 A	PEG4430.1000	1 g	€ 825,00
PEG4670 Fmoc-NH-O-dPEG™(12)-COOH	PEG4670.0100	100 mg	€ 235,00
alpha-(9-Fluorenylmethyloxycarbonyl-aminoxy)-omega-(propionic acid)-dodeca(ethylene glycol) FORMULA: $C_{42}H_{65}NO_{17}$ MOLECULAR WEIGHT: 855.96 g/mole	PEG4670.1000	1 g	€ 975,00
PEG4630 Phth-NO-dPEG™(12)-NHS	PEG4630.0100	100 mg	€ 325,00
alpha-Pthaloylaminoxy-omega-(succinimidyl propionate)-dodeca(ethylene glycol) FORMULA: $C_{39}H_{60}N_2O_{19}$ MOLECULAR WEIGHT: 860,90 g/mole	PEG4630.1000	1 g	€ 1425,00
PEG3180 Fmoc-NH-PEG(16)-COOH	please inquire!		
alpha-(9-Fluorenylmethyloxycarbonyl)amino-omega-carboxy hexadeca(ethylene glycol) CAS-NO: 756526-01-9 FORMULA: $C_{50}H_{81}NO_{20}$ MOLECULAR WEIGHT: 1016,17 g/mole FURTHER INFORMATION: Spacer length 51 atoms or 60.7 A			
PEG1815 Fmoc-NH-dPEG(24)-COOH	PEG1815.0100	100 mg	€ 325,00
alpha-Fmoc-amino-24(ethylene glycol)-omega-carboxylic acid CAS-NO: 756526-01-9 FORMULA: $C_{66}H_{113}NO_{28}$ MOLECULAR WEIGHT: 1368,63 g/mole FURTHER INFORMATION: Spacer length 76 atoms or 89 A	PEG1815.0001	1 g	€ 1025,00
PEG1210 Fmoc-NH-PEG(27)-COOH	PEG1210.0001	1 g	€ 900,00
alpha-(9-Fluorenylmethyloxycarbonyl)amino-27(ethylene glycol)-omega-propionic acid FORMULA: $C_{74}H_{129}NO_{32}$ MOLECULAR WEIGHT: 1544,8 g/mole	PEG1210.0005	5 g	€ 3250,00
PEG4400 Fmoc-NH-dPEG™(36)-COOH	PEG4400.0100	100 mg	€ 385,00
alpha-Fmoc-amino-36(ethylene glycol)-omega-carboxylic acid CAS-NO: 756526-01-9 FORMULA: $C_{90}H_{161}NO_{40}$ MOLECULAR WEIGHT: 1897,22 g/mole FURTHER INFORMATION: Spacer length 111 atoms or 132.7 A	PEG4400.1000	1 g	€ 1200,00
PEG1108 Fmoc-NH-PEG-COOH	PEG1108.0500	500 mg	€ 200,00
alpha-(9-Fluorenylmethyloxycarbonyl)amino-omega-carboxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG1108.0001	1 g	€ 350,00
	PEG1108.0005	5 g	€ 1500,00
PEG1109 Fmoc-NH-PEG-COOH	PEG1109.0500	500 mg	€ 200,00
alpha-(9-Fluorenylmethyloxycarbonyl)amino-omega-carboxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG1109.0001	1 g	€ 350,00
	PEG1109.0005	5 g	€ 1500,00
PEG1107 Fmoc-NH-PEG-COOH	PEG1107.0500	500 mg	€ 230,00
alpha-(9-Fluorenylmethyloxycarbonyl)amino-omega-carboxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG1107.0001	1 g	€ 400,00

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG1117	**Fmoc-NH-PEG-NHS** alpha-(9-Fluorenylmethyloxycarbonyl)amino-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG1117.0500	500 mg	€ 220,00
		PEG1117.0001	1 g	€ 375,00
PEG1118	**Fmoc-NH-PEG-NHS** alpha-(9-Fluorenylmethyloxycarbonyl)amino-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG1118.0500	500 mg	€ 220,00
		PEG1118.0001	1 g	€ 375,00
PEG1116	**Fmoc-NH-PEG-NHS** alpha-(9-Fluorenylmethyloxycarbonyl)amino-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG1116.0500	500 mg	€ 275,00
		PEG1116.0001	1 g	€ 440,00

3.2.6 Mtt and Mmt Protected Amino-PEG-Acids

Useful for incorporating a protected amine, whose protecting group is orthogonal to Fmoc strategy. The PEGylation spacer increases water solubility, provides non-immunogenicity, and non-aggregating properties.

Mmt can be removed under mild conditions, for example using very low concentrations of TFA (trifluoroacetic acid), hexafluoroisopropanol or 20% TFE (trifluoroethanol) in methylene choride. Acids need to be activated to the active ester with e.g. EDC or DCC, NHS, or PfOH.

References:

- Monomethoxytrityl (MMT) as a versatile amino protecting group for complex prodrugs of anticancer compounds sensitive to strong acids, bases and nucleophiles; G. M. Dubowchik and S. Radia; *Tetrahedron Lett* 1997; **38**: 5257-5260. doi:10.1016/S0040-4039(97)01158-1
- Evaluation of monomethoxytrityl and dimethoxytrityl as orthogonal amino protecting groups in Fmoc solid phase peptide synthesis; S. Matysiak, T. Böldicke, W. Tegge and R. Frank; *Tetrahedron Lett* 1998; **39**: 1733-1734. doi:10.1016/S0040-4039(98)00055-0
- The synthesis of polyamide nucleic acids using a novel monomethoxytrityl protecting-group strategy; D. W. Will, G. Breipohl, D. Langner, J. Knolle and E. Uhlmann; *Tetrahedron* 1995; **51**: 12069-12082. doi:10.1016/0040-4020(95)00766-2
- Preparation of the very acid-sensitive Fmoc-Lys(Mtt)-OH. Application in the synthesis of side-chain to side-chain cyclic peptides and oligolysine cores suitable for the solid-phase assembly of MAPs and TASPs; A. Aletras, K. Barlos, D. Gatos, S. Koutsogianni and P. Mamos; *Int J Pept Protein Res* 1995; **45**: 488-96.

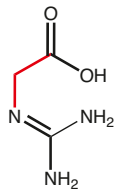
		Article No.	Quantity	Price
PEG4650	**Mtt-O2Oc-OH*DEA** N-(4-Methyltrity)-8-amino-3,6-dioxaoctanoic acid diethylamine FORMULA: $C_{26}H_{29}NO_4$*$C_4H_{11}N$ MOLECULAR WEIGHT: 419,51*73,14 g/mole	PEG4650.0001	1 g	€ 180,00
		PEG4650.0005	5 g	€ 700,00
		PEG4650.0025	25 g	€ 2800,00
PEG2160	**Mmt-NH-PEG(4)-COOH** 1-(p-Methoxytritylamino)-3,6,9,12-tetraoxapentadecanoic acid CAS-NO: 1263047-37-5 FORMULA: $C_{31}H_{39}NO_7$ MOLECULAR WEIGHT: 537,64 g/mole FURTHER INFORMATION: Space length 28 atoms or 32.2 A	PEG2160.0100	100 mg	€ 200,00
		PEG2160.0001	1 g	€ 385,00
PEG4500	**Mmt-NH-dPEG™(4)-TFP** 15-(p-Methoxytritylamino)-4,7,10,13-tetraoxa-pentadecanoic acid 2,3,5,6-tetrafluorphenyl ester CAS-NO: 1314378-09-0 FORMULA: $C_{37}H_{39}F_4NO_7$ MOLECULAR WEIGHT: 685,7 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18.1 A	PEG4500.0100	100 mg	€ 250,00
		PEG4500.1000	1 g	€ 455,00

Prices are in EUR, net, exw Germany

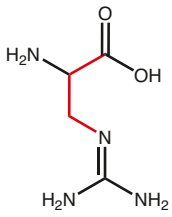
	Article No.	Quantity	Price
PEG2265 Mmt-NH-PEG(8)-COOH	PEG2265.0100	100 mg	€ 235,00
alpha-p-Methoxytritylamino-omega-carboxy octa(ethylene glycol) CAS-NO: 1334177-98-8 FORMULA: $C_{38}H_{55}NO_{11}$ MOLECULAR WEIGHT: 713,85 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A	PEG2265.0001	1 g	€ 750,00
PEG4510 Mmt-NH-dPEG™(8)-TFP	PEG4510.0100	100 mg	€ 275,00
alpha-p-Methoxytritylamino-omega-(2,3,5,6-tetrafluorphenyl propionate) octa(ethylene glycol) CAS-NO: 1334169-91-3 FORMULA: $C_{45}H_{55}F_4NO_{11}$ MOLECULAR WEIGHT: 861,91 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 31.4 A	PEG4510.1000	1 g	€ 800,00
PEG2270 Mmt-NH-PEG(12)-COOH	PEG2270.0100	100 mg	€ 265,00
alpha-p-Methoxytritylamino-omega-carboxy dodeca(ethylene glycol) CAS-NO: 1334177-99-9 FORMULA: $C_{47}H_{71}NO_{15}$ MOLECULAR WEIGHT: 890,06 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 46.5 A	PEG2270.0001	1 g	€ 860,00
PEG4520 Mmt-NH-dPEG™(12)-TFP	PEG4520.0100	100 mg	€ 300,00
alpha-p-Methoxytritylamino-omega-(2,3,5,6-tetrafluorphenyl propionate) dodeca(ethylene glycol) CAS-NO: 1334169-92-4 FORMULA: $C_{53}H_{71}F_4NO_{15}$ MOLECULAR WEIGHT: 1038,12 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 46.4 A	PEG4520.1000	1 g	€ 975,00
PEG2275 Mmt-NH-PEG(16)-COOH			please inquire!
alpha-p-Methoxytritylamino-omega-carboxy hexadeca(ethylene glycol) CAS-NO: 1334177-99-9 FORMULA: $C_{55}H_{87}NO_{19}$ MOLECULAR WEIGHT: 1066,27 g/mole FURTHER INFORMATION: Space length 52 atoms or 60.4 A			
PEG2280 Mmt-NH-PEG(24)-COOH	PEG2280.0100	100 mg	€ 355,00
alpha-p-Methoxytritylamino-omega-carboxy 24(ethylene glycol) CAS-NO: 1334177-99-9 FORMULA: $C_{71}H_{119}NO_{27}$ MOLECULAR WEIGHT: 1418,7 g/mole FURTHER INFORMATION: Spacer length 76 atoms or 89 A	PEG2280.0001	1 g	€ 1425,00

Amino acids analogues for peptidomimetics and medicinal chemistry.

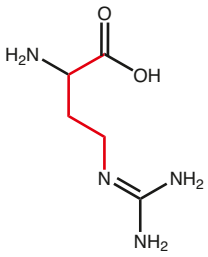
Amidino-Glycine
BAA6380



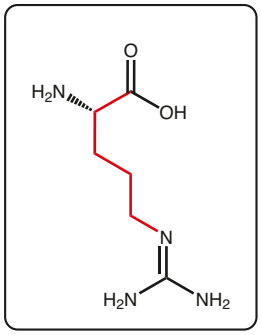
Amino-guanidino propionic acid
FAA1772



Amino-guanidino butyric acid
FAA6160



Arginine



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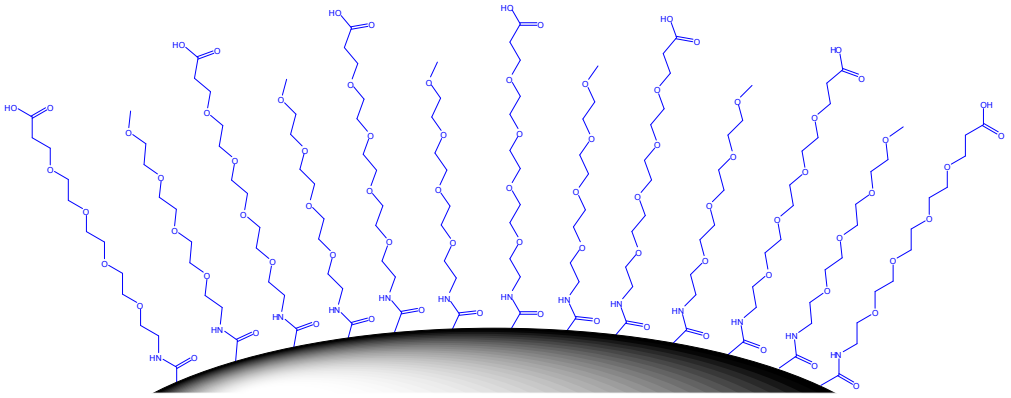
3.2.7 N-Unprotected Amino-PEG-Acids and Esters

- An Amino-PEG spacer will enhance the water solubility, minimize or eliminate aggregation problems with its incorporation into peptides and related compounds. The spacer is also non-immunogenic.
- These PEGs are used for coating of beads or nanoparticles in order to reduce nonspecific binding problems. They can be activated via standard coupling chemistries, as the amine reacts unspecifically with NHS and other active esters in the presence of a tertiary amine, e.g., TEA.
- Amino-PEG-Acids are zwitterionic, extremely water soluble, soluble in methylene chloride, and soluble in other organic solvents of moderate polarity.
- t-Butyl esters easily can be saponified with TFA (25% TFA in DCM, 0°C, 5 h).
- The t-Butyl group provides a potentially powerful purification handle due to its hydrophobicity. After normal phase chromatographic purification (e.g., silica gel) it can be removed to perform additional chemistry.
- The t-Butyl group neutralizes the zwitterion of the amino acid for better reactivity at the amine.

Amino-PEG-acids can be applied to surfaces as well as particles. The carboxylic acid density on the surface can be reduced by co-coating with mPEG-amines, which are generally equal or shorter than the amino-PEG-acids:

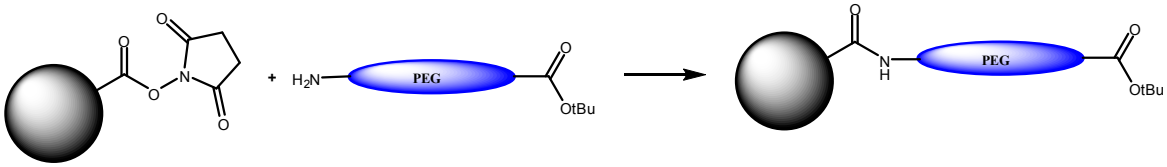


Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; **Ch. 14**: 582-626; ISBN 978-0-12-370501-3

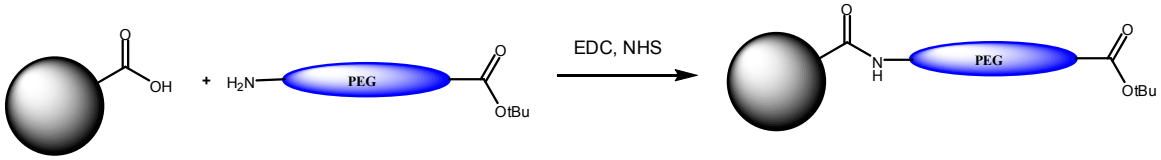
General protocols for reactions with active esters:

Dissolve the active ester in an appropriate dry solvent (methylene chloride is preferred), add triethylamine and then the PEG-amine, either neat or dropwise as a solution in the reaction solvent. Use at least a 10% excess of all reagents relative to the active ester. This can be carried out at ambient temperatures.



General protocols for reactions with free acids:

1. Generate the active ester in situ with EDC and NHS, then add the TEA, followed by the amino-PEG-t-butyl ester; or
2. Combine acid, NHS, TEA, and the amino-PEG-t-butyl ester, and add a solution of EDC. Use at least 10% excess of reagents relative to the acid.
3. Other Carbodiimides than EDC can be used, but the high water solubility and polar nature of the urea end product makes work-up very efficient with EDC compared to DIC or DCC. Normal reaction temperatures are -10°C to 0°C. Monitoring by chromatography (TLC or HPLC) is essential.



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	Article No.	Quantity	Price
PEG1365 H_2N-EG2-CO-OtBu 3-(2-(2-Aminoethoxy)ethoxy)propanoic acid t-butyl ester CAS-NO: 756525-95-8 FORMULA: $C_{11}H_{23}NO_4$ MOLECULAR WEIGHT: 233,3 g/mole FURTHER INFORMATION: Spacer length 10 atoms or 10.9 A	PEG1365.0100	100 mg	€ 175,00
	PEG1365.0001	1 g	€ 275,00
PEG2420 H-O2Oc-OH [2-(2-aminoethoxy)ethoxy]acetic acid CAS-NO: 134978-97-5 FORMULA: $C_6H_{13}NO_4$ MOLECULAR WEIGHT: 163,2 g/mole	PEG2420.0001	1 g	€ 90,00
	PEG2420.0005	5 g	€ 350,00
	PEG2420.0025	25 g	€ 1400,00
PEG2430 H-O2Oc-OtBu*HCl [2-(2-aminoethoxy)ethoxy]acetic acid tert-butyl ester*HCl CAS-NO: 251564-45-1 net FORMULA: $C_{10}H_{21}NO_4$*HCl MOLECULAR WEIGHT: 219,28*36,45 g/mole	PEG2430.0001	1 g	€ 250,00
	PEG2430.0005	5 g	€ 1000,00
PEG1221 H-O2Oc-O2Oc-OH 17-Amino-10-oxo-3,6,12,15-tetraoxa-9-azaheptadecan-1-oic acid CAS-NO: 1143516-05-5 FORMULA: $C_{12}H_{24}N_2O_7$ MOLECULAR WEIGHT: 308,33 g/mole	PEG1221.0001	1 g	€ 225,00
	PEG1221.0005	5 g	€ 900,00
PEG2770 H-O2Oc-O2Oc-O2Oc-OH 26-amino-10,19-dioxo-3,6,12,15,21,24-hexaoxa-9,18-diazahexacosan-1-oic acid FORMULA: $C_{18}H_{35}N_3O_{10}$ MOLECULAR WEIGHT: 453,48 g/mole	PEG2770.0250	250 mg	€ 175,00
	PEG2770.0001	1 g	€ 500,00
PEG1370 H_2N-dPEG(4)-COOH 15-Amino-4,7,10,13-tetraoxa-pentadecanoic acid CAS-NO: 663921-15-1 FORMULA: $C_{11}H_{23}NO_6$ MOLECULAR WEIGHT: 265,3 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18.0 A	PEG1370.0100	100 mg	€ 175,00
	PEG1370.0001	1 g	€ 455,00
PEG1375 H_2N-dPEG(4)-CO-OtBu 15-Amino-4,7,10,13-tetraoxa-pentadecanoic acid t-butyl ester CAS-NO: 581065-95-4 FORMULA: $C_{15}H_{31}NO_6$ MOLECULAR WEIGHT: 321,41 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18.0 A	PEG1375.0100	100 mg	€ 210,00
	PEG1375.0001	1 g	€ 525,00
PEG1300 H_2N-dPEG(6)-COOH 1-Amino-3,6,9,12,15,18-hexaoxahenicosan-21-oic acid CAS-NO: 905954-28-1 FORMULA: $C_{15}H_{31}NO_8$ MOLECULAR WEIGHT: 353,41 g/mole FURTHER INFORMATION: Spacer length 22 atoms or 25.1 A	PEG1300.0100	100 mg	€ 175,00
	PEG1300.0001	1 g	€ 525,00
PEG1305 H_2N-dPEG(6)-CO-OtBu 1-Amino-3,6,9,12,15,18-hexaoxahenicosan-21-oic acid t-butyl ester CAS-NO: 1286281-32-0 FORMULA: $C_{19}H_{39}NO_8$ MOLECULAR WEIGHT: 409,51 g/mole FURTHER INFORMATION: Spacer length 22 atoms or 25.1 A	PEG1305.0100	100 mg	€ 210,00
	PEG1305.0001	1 g	€ 650,00

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	Article No.	Quantity	Price
PEG1380 H_2N-dPEG(8)-COOH 1-Amino-3,6,9,12,15,18,21,24-octaoxaheptaeicosane-27-oic acid CAS-NO: 756526-04-2 FORMULA: $C_{19}H_{39}NO_{10}$ MOLECULAR WEIGHT: 441,51 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A	PEG1380.0100 PEG1380.0001	100 mg 1 g	€ 235,00 € 645,00
PEG1385 H_2N-dPEG(8)-CO-OtBu 1-Amino-3,6,9,12,15,18,21,24-octaoxaheptaeicosane-27-oic acid t-butyl ester CAS-NO: 756526-06-4 FORMULA: $C_{23}H_{47}NO_{10}$ MOLECULAR WEIGHT: 497,62 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A	PEG1385.0100 PEG1385.0001	100 mg 1 g	€ 235,00 € 775,00
PEG1345 H_2N-dPEG(12)-COOH 1-Amino-3,6,9,12,15,18,21,24,27,30,33,36-dodecaoxanonatriacontan-39-oic acid CAS-NO: 756526-07-4 FORMULA: $C_{27}H_{55}NO_{14}$ MOLECULAR WEIGHT: 617,72 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 46.5 A	PEG1345.0100 PEG1345.0001	100 mg 1 g	€ 260,00 € 880,00
PEG1350 H_2N-dPEG(12)-CO-OtBu 1-Amino-3,6,9,12,15,18,21,24,27,30,33,36-dodecaoxanonatriacontan-39-oic acid t-butyl ester CAS-NO: 872340-65-3 FORMULA: $C_{31}H_{63}NO_{14}$ MOLECULAR WEIGHT: 673,83 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 46.5 A	PEG1350.0100 PEG1350.0001	100 mg 1 g	€ 295,00 € 875,00
PEG3690 H_2N-dPEG™(16)-CO-OtBu alpha-Amino-omega-(t-butyl propionate) hexadeca(ethylene glycol) CAS-NO: 872340-65-3 FORMULA: $C_{39}H_{79}NO_{18}$ MOLECULAR WEIGHT: 850,04 g/mole FURTHER INFORMATION: Spacer length 51 atoms or 60.7 A	please inquire!		
PEG3700 H_2N-dPEG™(20)-CO-OtBu alpha-Amino-omega-(t-butyl propionate) 20(ethylene glycol) CAS-NO: 872340-65-3 FORMULA: $C_{47}H_{95}NO_{22}$ MOLECULAR WEIGHT: 1026,25 g/mole FURTHER INFORMATION: Spacer length 64 atoms or 75.2 A	please inquire!		
PEG1355 H_2N-dPEG(24)-COOH alpha-Amino-24(ethylene glycol)-omega-propionic acid CAS-NO: 756526-07-4 FORMULA: $C_{51}H_{103}NO_{26}$ MOLECULAR WEIGHT: 1146,38 g/mole FURTHER INFORMATION: Spacer length 76 atoms or 89 A	PEG1355.0100 PEG1355.0001	100 mg 1 g	€ 325,00 € 1200,00
PEG1360 H_2N-dPEG(24)-CO-OtBu alpha-Amino-24(ethylene glycol)-omega-propionic acid t-butyl ester CAS-NO: 872340-65-3 FORMULA: $C_{55}H_{111}NO_{26}$ MOLECULAR WEIGHT: 1202,49 g/mole FURTHER INFORMATION: Spacer length 79 atoms or 89 A	PEG1360.0100 PEG1360.0001	100 mg 1 g	€ 325,00 € 1250,00

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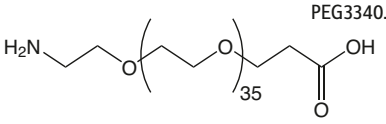
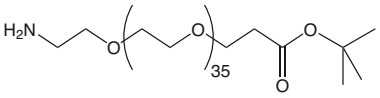
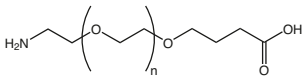
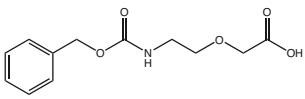
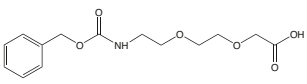
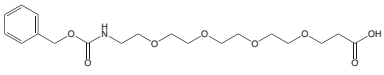
		Article No.	Quantity		Price
PEG3340	**H_2N-dPEG™(36)-COOH**	PEG3340.0100	100 mg	€	385,00
alpha-Amino-omega-propionic acid-36(ethylen glycol) CAS-NO: 756526-07-4 FORMULA: $C_{75}H_{151}NO_{38}$ MOLECULAR WEIGHT: 1674,99 g/mole FURTHER INFORMATION: Spacer length 111 atoms or 132.7 A		PEG3340.1000	1 g	€	1475,00
PEG3710	**H_2N-dPEG™(36)-CO-OtBu**	PEG3710.0100	100 mg	€	385,00
alpha-Amino-omega-(t-butyl propionate) 36(ethylene glycol) CAS-NO: 872340-65-3 FORMULA: $C_{79}H_{159}NO_{38}$ MOLECULAR WEIGHT: 1731,09 g/mole FURTHER INFORMATION: Spacer length 111 atoms or 132.7 A		PEG3710.1000	1 g	€	1500,00
PEG1096	**H_2N-PEG-COOH*HCl**	PEG1096.0500	500 mg	€	180,00
alpha-Amino-omega-carboxy poly(ethylene glycol) hydrochloride (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1096.0001	1 g	€	325,00
		PEG1096.0005	5 g	€	1180,00
PEG1097	**H_2N-PEG-COOH*HCl**	PEG1097.0500	500 mg	€	180,00
alpha-Amino-omega-carboxy poly(ethylene glycol) hydrochloride (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1097.0001	1 g	€	325,00
PEG1095	**H_2N-PEG-COOH*HCl**	PEG1095.0500	500 mg	€	225,00
alpha-Amino-omega-carboxy poly(ethylene glycol) hydrochloride (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1095.0001	1 g	€	375,00

3.2.8 Z Protected Amino-PEG-Acids

Z Protected Amino-PEG-Acids are used for incorporating a PEG unit using standard Cbz-chemistry either as a spacer or terminal group in peptide sequences, typically in solution peptide synthesis.

The Cbz or Z protecting group is being deprotected by hydrogenolysis using catalytic Pd/C.

This PEG spacer provides water solubility, reduces or eliminates aggregation and is inherently non-immunogenic and non-toxic.

		Article No.	Quantity		Price
PEG4710	**Z-O1Pen-OH**	PEG4710.0005	5 g	€	300,00
5-(Benzyloxycarbonyl-amino)-3-oxa-pentanoic acid CAS-NO: 1260092-43-0 FORMULA: $C_{12}H_5NO_5$ MOLECULAR WEIGHT: 253,25 g/mole		PEG4710.0025	25 g	€	1200,00
ZAA1186	**Z-O2Oc-OH*DCHA**	ZAA1186.0001	1 g	€	85,00
8-(Benzyloxycarbonyl-amino)-3,6-dioxaoctanoic acid dicyclohexyl-amine CAS-NO: 560088-84-8 FORMULA: $C_{14}H_{19}NO_6*C_{12}H_{23}N$ MOLECULAR WEIGHT: 297,31*181,32 g/mole		ZAA1186.0005	5 g	€	225,00
		ZAA1186.0025	25 g	€	900,00
PEG1495	**Z-NH-dPEG(4)-COOH**	PEG1495.0100	100 mg	€	200,00
15-Benzyloxycarbonylamino-4,7,10,13-tetraoxa-pentadecanoic acid CAS-NO: 756526-00-8 FORMULA: $C_{19}H_{29}NO_8$ MOLECULAR WEIGHT: 399,44 g/mole FURTHER INFORMATION: Spacer length 17 atoms or 19.2 A		PEG1495.0001	1 g	€	300,00

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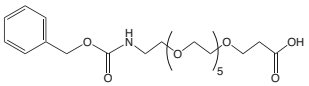
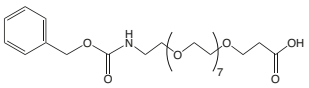
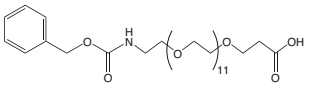
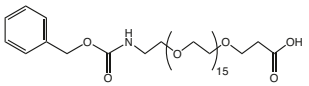
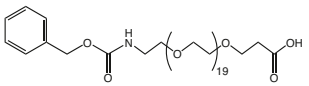
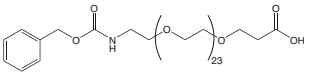
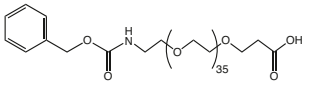
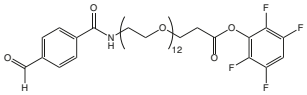
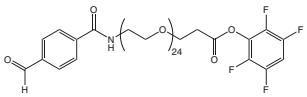
		Article No.	Quantity	Price
PEG1795	**Z-NH-dPEG(6)-COOH**	PEG1795.0100	100 mg	€ 225,00
1-Benzyloxycarbonylamino-3,6,9,12,15,18-hexaoxahenicosan-21-oic acid CAS-NO: 1334177-80-8 FORMULA: $C_{23}H_{37}NO_{10}$ MOLECULAR WEIGHT: 487,54 g/mole FURTHER INFORMATION: Spacer length 22 atoms or 25.1 A		PEG1795.0001	1 g	€ 400,00
PEG1800	**Z-NH-dPEG(8)-COOH**	PEG1800.0100	100 mg	€ 225,00
1-Benzyloxycarbonylamino-3,6,9,12,15,18,21,24-octaoxaheptacosan-27-oic acid CAS-NO: 1334177-87-5 FORMULA: $C_{27}H_{45}NO_{12}$ MOLECULAR WEIGHT: 575,65 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A		PEG1800.0001	1 g	€ 695,00
PEG1785	**Z-NH-dPEG(12)-COOH**	PEG1785.0100	100 mg	€ 225,00
1-Benzyloxycarbonylamino-3,6,9,12,15,18,21,24,27,30,33,36-dodecaoxanonatriacontan-39-oic acid CAS-NO: 1334177-88-6 FORMULA: $C_{35}H_{61}NO_{16}$ MOLECULAR WEIGHT: 751,86 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 46.5 A		PEG1785.0001	1 g	€ 725,00
PEG4570	**Z-NH-dPEG™(16)-COOH**			please inquire!
alpha-Benzyloxycarbonylamino-hexadeca(ethylene glycol)-omega-carboxylic acid CAS-NO: 1334177-88-6 FORMULA: $C_{43}H_{77}NO_{20}$ MOLECULAR WEIGHT: 928,07 g/mole FURTHER INFORMATION: Spacer length 51 atoms or 60.7 A				
PEG4580	**Z-NH-dPEG™(20)-COOH**			please inquire!
alpha-Benzyloxycarbonylamino-amino-20(ethylene glycol)-omega-carboxylic acid CAS-NO: 1334177-88-6 FORMULA: $C_{51}H_{93}NO_{24}$ MOLECULAR WEIGHT: 1103,61 g/mole FURTHER INFORMATION: Spacer length 64 atoms or 75.2 A				
PEG1790	**Z-NH-dPEG(24)-COOH**	PEG1790.0100	100 mg	€ 325,00
alpha-Benzyloxycarbonylamino-24(ethylene glycol)-omega-propionic acid CAS-NO: 1334177-88-6 FORMULA: $C_{59}H_{109}NO_{28}$ MOLECULAR WEIGHT: 1280,52 g/mole		PEG1790.0001	1 g	€ 825,00
PEG4590	**Z-NH-dPEG™(36)-COOH**	PEG4590.0100	100 mg	€ 385,00
alpha-Benzyloxycarbonylamino-amino-36(ethylene glycol)-omega-carboxylic acid CAS-NO: 1334177-88-6 FORMULA: $C_{83}H_{157}NO_{40}$ MOLECULAR WEIGHT: 1809,12 g/mole FURTHER INFORMATION: Spacer length 111 atoms or 132.7 A		PEG4590.1000	1 g	€ 1100,00

Find many aliphatic diamine and polyamine derivatives and our custom synthesis capabilities in our brochure **Diamines & Polyamines.**

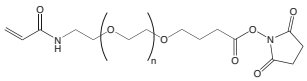
Prices are in EUR, net, exw Germany

3.3 PEG-Acids carrying various other Terminal Groups

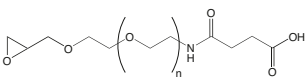
3.3.1 Formyl-PEG-Esters

		Article No.	Quantity	Price
PEG4690 FB-dPEG(12)™-TFP alpha-(p-Formylbenzoylamido)-omega-[(2,3,5,6-tetrafluorophenyl) propionate]-dodeca(ethylene glycol) FORMULA: $C_{41}H_{59}F_4NO_{16}$ MOLECULAR WEIGHT: 897,90 g/mole		PEG4690.0100 PEG4690.1000	100 mg 1 g	€ 265,00 € 1425,00
PEG4700 FB-dPEG(24)™-TFP alpha-(p-Formylbenzoylamido)-omega-[(2,3,5,6-tetrafluorophenyl) propionate]-24(ethylene glycol) FORMULA: $C_{65}H_{107}F_4NO_{28}$ MOLECULAR WEIGHT: 1426,53 g/mole		PEG4700.0100 PEG4700.1000	100 mg 1 g	€ 355,00 € 1750,00

3.3.2 Acryloyl-PEG-Esters

		Article No.	Quantity	Price
PEG1223 ACRL-PEG-NHS alpha-Acryloyl-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1223.0500 PEG1223.0001	500 mg 1 g	€ 1500,00 € 2500,00
PEG1224 ACRL-PEG-NHS alpha-Acryloyl-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1224.0500 PEG1224.0001	500 mg 1 g	€ 1750,00 € 2500,00
PEG1222 ACRL-PEG-NHS alpha-Acryloyl-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1222.0500 PEG1222.0001	500 mg 1 g	€ 1500,00 € 2500,00

3.3.3 Epoxy-PEG-Acids

		Article No.	Quantity	Price
PEG1208 Epoxy-PEG-COOH alpha-Epoxy-omega-carboxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1208.0500 PEG1208.0001	500 mg 1 g	€ 1750,00 € 2500,00

Other Epoxy-PEG derivatives available on custom synthesis basis

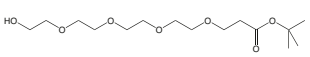
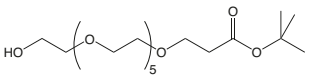
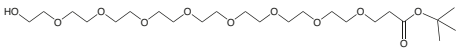
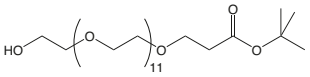
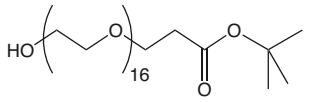
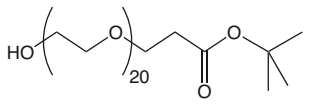
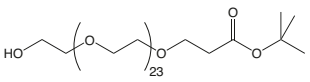
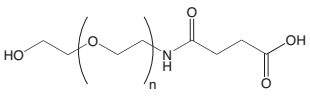
3.3.4 Hydroxy-PEG-Acids

Hydroxy-PEG-Acids can be used as starting material to make a variety of other functional PEG based compounds.

They are surface modification reagents with a free alcohol, which can be reacted with activated surfaces or converted to other reactive functionalities.

These PEG spacers are hydrophilic, water soluble and nonimmunogenic, and will incorporate these properties into any application.

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG1535 **HO-dPEG(4)-CO-OtBu**		PEG1535.0100	100 mg	€ 175,00
15-Hydroxy-4,7,10,13-tetraoxa-pentadecanoic acid t-butyl ester CAS-NO: 518044-32-1 FORMULA: $C_{15}H_{30}O_7$ MOLECULAR WEIGHT: 322,39 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18.0 A		PEG1535.0001	1 g	€ 300,00
PEG2355 **HO-PEG(6)-CO-OtBu**		PEG2355.0100	100 mg	€ 200,00
alpha-Hydroxy-omega-carboxy t-butyl ester hexa(ethylene glycol) CAS-NO: 361189-64-2 FORMULA: $C_{19}H_{38}O_9$ MOLECULAR WEIGHT: 410,5 g/mole FURTHER INFORMATION: Spacer length 22 atoms or 25.1 A		PEG2355.0001	1 g	€ 400,00
PEG1540 **HO-dPEG(8)-CO-OtBu**		PEG1540.0100	100 mg	€ 225,00
t-Butyl 1-hydroxy-3,6,9,12,15,18,21,24-octaoxaheptacosan-27-oate CAS-NO: 1334177-84-2 FORMULA: $C_{23}H_{46}O_{11}$ MOLECULAR WEIGHT: 498,6 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.1 A		PEG1540.0001	1 g	€ 400,00
PEG1090 **HO-PEG(12)-CO-OtBu**		PEG1090.0001	1 g	€ 300,00
alpha-Hydroxy-omega-t-butyl propionat dodecae(ethylene glycol) FORMULA: $C_{31}H_{62}O_{15}$ MOLECULAR WEIGHT: 674,81 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 46.4 A		PEG1090.0005	5 g	€ 975,00
PEG3720 **HO-dPEG™(16)-COOH**		please inquire!		
alpha-Hydroxy-omega-(t-butyl propionate) hexadecae(ethylene glycol) CAS-NO: 1186025-29-5 FORMULA: $C_{39}H_{78}O_{19}$ MOLECULAR WEIGHT: 851,03 g/mole FURTHER INFORMATION: Spacer length 51 atoms or 60.8 A				
PEG3730 **HO-dPEG™(20)-COOH**		please inquire!		
alpha-Hydroxy-omega-(t-butyl propionate) 20(ethylene glycol) CAS-NO: 1186025-29-5 FORMULA: $C_{47}H_{94}O_{23}$ MOLECULAR WEIGHT: 1027,24 g/mole FURTHER INFORMATION: Spacer length 63 atoms or 75.2 A				
PEG2365 **HO-PEG(24)-CO-tBu**		PEG2365.0100	100 mg	€ 385,00
alpha-Hydroxy-omega-carboxy t-butyl ester 24(ethylene glycol) CAS-NO: 1186025-29-5 FORMULA: $C_{55}H_{110}O_{27}$ MOLECULAR WEIGHT: 1203,45 g/mole FURTHER INFORMATION: Spacer length 86 atoms or 89.5 A		PEG2365.0001	1 g	€ 950,00
PEG1093 **HO-PEG-COOH**		PEG1093.0500	500 mg	€ 140,00
alpha-Hydroxy-omega-carboxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1093.0001	1 g	€ 200,00
PEG1094 **HO-PEG-COOH**		PEG1094.0500	500 mg	€ 140,00
alpha-Hydroxy-omega-carboxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1094.0001	1 g	€ 200,00
PEG1092 **HO-PEG-COOH**		PEG1092.0500	500 mg	€ 165,00
alpha-Hydroxy-omega-carboxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1092.0001	1 g	€ 250,00

Prices are in EUR, net, exw Germany

3.3.5 PEG-Di-(Carboxylic Acids)

PEG-Di-(Carboxylic Acids) are homobifunctional amine reactive PEG crosslinkers.

They are used as "heterobifunctional" label for amine functionalized surfaces, including nanoparticles and cells.

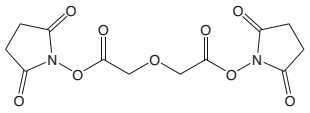
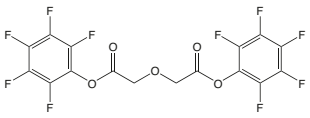
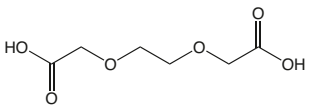
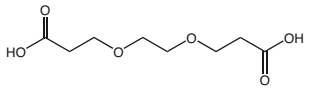
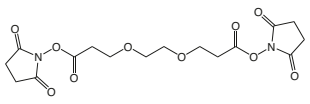
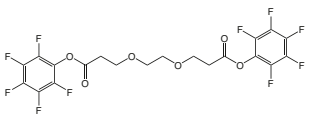
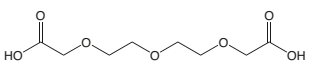
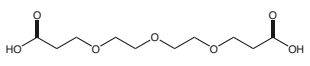
These PEG spacers are extremely hydrophilic and non-immunogenic.

The Bis-PEG-acid can be coupled using standard in situ activation methods, e.g., EDC and NHS in methylene chloride.

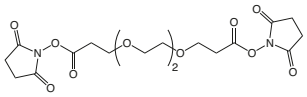
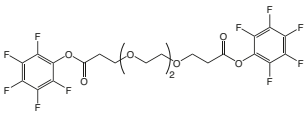
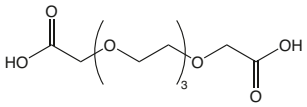
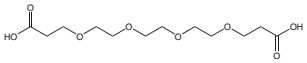
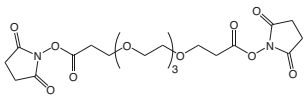
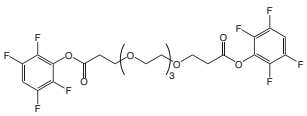
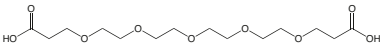
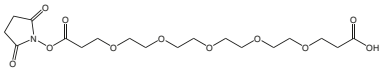
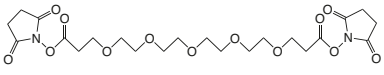
The Pfp esters react with amines in the same way as do the NHS esters, yet are more stable in aqueous solution than the NHS esters.

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; **Ch. 18**: 711-714; ISBN 978-0-12-370501-3

		Article No.	Quantity	Price
PEG1990	**DIG(NHS)$_2$**	PEG1990.0001	1 g	€ 95,00
2,2'-Oxydiacetic acid bis-N-succinimidyl ester CAS-NO: 373614-12-1 FORMULA: $C_{12}H_{12}N_2O_9$ MOLECULAR WEIGHT: 328,23 g/mole		PEG1990.0005	5 g	€ 300,00
		PEG1990.0025	25 g	€ 1200,00
PEG1985	**DIG(Pfp)$_2$**	PEG1985.0001	1 g	€ 90,00
2,2'-Oxydiacetic acid bis-pentafluorophenyl ester CAS-NO: 158573-58-1 FORMULA: $C_{16}H_4F_{10}O_5$ MOLECULAR WEIGHT: 466,18 g/mole		PEG1985.0005	5 g	€ 350,00
		PEG1985.0025	25 g	€ 1400,00
PEG2035	**DOODA**	PEG2035.0005	5 g	€ 200,00
3,6-Dioxaoctanedioic acid CAS-NO: 23243-68-7 FORMULA: $C_6H_{10}O_6$ MOLECULAR WEIGHT: 178,14 g/mole FURTHER INFORMATION: Spacer length 10s atoms or 11.0 A		PEG2035.0025	25 g	€ 600,00
PEG4885	**HOOC-dPEG™(2)-COOH**	PEG4885.0100	100 mg	€ 200,00
Ethyleneglycol-bis(propionic acid) CAS-NO: 19364-66-0 FORMULA: $C_8H_{14}O_6$ MOLECULAR WEIGHT: 206,19 g/mole		PEG4885.1000	1 g	€ 525,00
PEG4120	**NHS-PEG(2)-NHS**	PEG4120.0100	100 mg	€ 225,00
3,6-Dioxaoctandioic acid bissuccinimidyl ester CAS-NO: 65869-63-8 FORMULA: $C_{16}H_{20}N_2O_{10}$ MOLECULAR WEIGHT: 400,34 g/mole FURTHER INFORMATION: Spacer length 10 atoms or 11.0 A		PEG4120.1000	1 g	€ 430,00
PEG4020	**Pfp-PEG(2)-Pfp**	PEG4020.0100	100 mg	€ 225,00
3,6-Dioxaoctandioic acid bispentafluorphenyl ester CAS-NO: 1314378-18-1 FORMULA: $C_{20}H_{12}F_{10}O_6$ MOLECULAR WEIGHT: 538,29 g/mole FURTHER INFORMATION: Spacer length 10 atoms or 11.0 A		PEG4020.1000	1 g	€ 750,00
PEG2030	**TUDA**	PEG2030.0025	25 g	€ 90,00
3,6,9-Trioxaundecandioic acid CAS-NO: 13887-98-4 FORMULA: $C_8H_{14}O_7$ MOLECULAR WEIGHT: 222,19 g/mole FURTHER INFORMATION: Spacer length 13 atoms or 14.6 A		PEG2030.0100	100 g	€ 290,00
PEG4875	**HOOC-dPEG™(3)-COOH**	PEG4875.0100	100 mg	€ 200,00
Diethyleneglycol-bis(propionic acid) CAS-NO: 96517-92-9 FORMULA: $C_{10}H_{18}O_7$ MOLECULAR WEIGHT: 250,25 g/mole		PEG4875.1000	1 g	€ 550,00

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG4130	**NHS-PEG(3)-NHS**	PEG4130.0100	100 mg	€ 225,00
3,6,9-Trioxaundecandioic acid bissuccinimidyl ester CAS-NO: 1314378-16-9 FORMULA: $C_{18}H_{24}N_2O_{11}$ MOLECULAR WEIGHT: 444,39 g/mole FURTHER INFORMATION: Spacer length 13 atoms or 14.6 A		PEG4130.1000	1 g	€ 430,00
PEG4030	**Pfp-PEG(3)-Pfp**	PEG4030.0100	100 mg	€ 225,00
3,6,9-Trioxaundecandioic acid bispentafluorphenyl ester CAS-NO: 1314378-13-6 FORMULA: $C_{22}H_{16}F_{10}O_7$ MOLECULAR WEIGHT: 582,34 g/mole FURTHER INFORMATION: Spacer length 13 atoms or 14.5 A		PEG4030.1000	1 g	€ 610,00
PEG3170	**HOOC-PEG(4)-COOH**	PEG3170.0250	250 mg	€ 200,00
3,6,9,12-Tetraoxatetradecane-1,14-dioic acid CAS-NO: 32775-08-9 FORMULA: $C_{10}H_{18}O_8$ MOLECULAR WEIGHT: 266,25 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18.1 A		PEG3170.0001	1 g	€ 600,00
		PEG3170.0005	5 g	€ 2400,00
PEG4880	**HOOC-dPEG™(4)-COOH**	PEG4880.0100	100 mg	€ 200,00
Tetraethyleneglycol-bis(propionic acid) CAS-NO: 31127-85-2 FORMULA: $C_{12}H_{22}O_8$ MOLECULAR WEIGHT: 294,30 g/mole		PEG4880.1000	1 g	€ 575,00
PEG3960	**NHS-dPEG™(4)-NHS**	PEG3960.0100	100 mg	€ 225,00
Bis-succinimidyl-4,7,10,13-tetraoxahexadecane-1,16-dioate CAS-NO: 1314378-11-4 FORMULA: $C_{20}H_{28}N_2O_{12}$ MOLECULAR WEIGHT: 488,44 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18.1 A		PEG3960.1000	1 g	€ 495,00
PEG4041	**Tfp-dPEG™(4)-Tfp**	PEG4041.0100	100 mg	€ 225,00
alpha,omega-Bis(tertrafluorphenyl propionate) tri(ethylene glycol) FORMULA: $C_{24}H_{22}F_8O_8$ MOLECULAR WEIGHT: 590,41 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18.1 A		PEG4041.1000	1 g	€ 725,00
PEG1430	**HOOC-PEG(5)-COOH**	PEG1430.0100	100 mg	€ 200,00
4,7,10,13,16-Pentaoxanonadecane-1,19-dioic acid CAS-NO: 439114-13-3 FORMULA: $C_{14}H_{26}O_9$ MOLECULAR WEIGHT: 338,35 g/mole FURTHER INFORMATION: Spacer length 19atoms or 21.7 A		PEG1430.0001	1 g	€ 575,00
PEG5090	**NHS-dPEG™(5)-COOH**	PEG5090.0100	100 mg	€ 275,00
Succinimidyl-4,7,10,13,16-pentaoxanonadecane-1,19-dicarboxylic acid FORMULA: $C_{18}H_{29}NO_{11}$ MOLECULAR WEIGHT: 435,42 g/mole FURTHER INFORMATION: Spacer length 19 atoms or 21.6 A		PEG5090.1000	1 g	€ 1375,00
PEG1435	**NHS-dPEG(5)-NHS**	PEG1435.0100	100 mg	€ 225,00
Bis-succinimidyl-4,7,10,13,16-pentaoxanonadecane-1,19-dioate CAS-NO: 756526-03-1 FORMULA: $C_{22}H_{32}N_2O_{13}$ MOLECULAR WEIGHT: 532,51 g/mole FURTHER INFORMATION: Spacer length 19 atoms or 21.7 A		PEG1435.0001	1 g	€ 550,00

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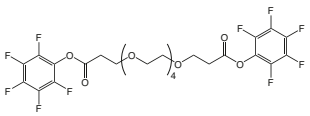
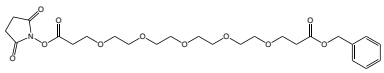
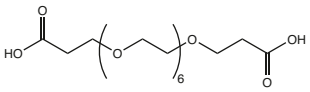
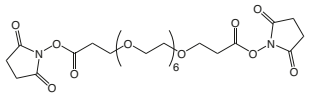
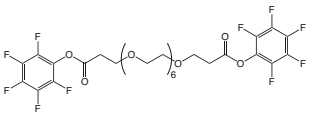
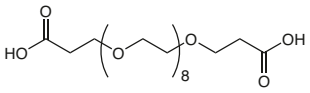
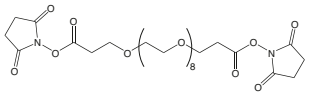
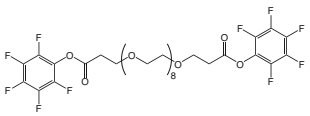
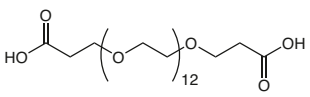
		Article No.	Quantity	Price
PEG4050	**Pfp-dPEG™(5)-Pfp**	PEG4050.0100	100 mg	€ 225,00
alpha,omega-Bis(pentafluorphenyl propionate) penta(ethylene glycol)		PEG4050.1000	1 g	€ 750,00
CAS-NO: 1334177-78-4				
FORMULA: $C_{26}H_{24}F_{10}O_9$				
MOLECULAR WEIGHT: 670,45 g/mole				
FURTHER INFORMATION: Spacer length 19 atoms or 21.7 A				
PEG2115	**NHS-PEG(5)-CO-OBzl**	PEG2115.0100	100 mg	€ 325,00
alpha-succinimidyl ester-omega-carboxy benzyl ester penta(ethylene glycol)		PEG2115.0001	1 g	€ 1250,00
CAS-NO: 1263044-84-3				
FORMULA: $C_{25}H_{35}NO_{11}$				
MOLECULAR WEIGHT: 525,55 g/mole				
FURTHER INFORMATION: Spacer length 19 atoms or 21.7 A				
PEG1450	**HOOC-dPEG(7)-COOH**	PEG1450.0100	100 mg	€ 265,00
4,7,10,13,16,19,22-Heptaoxapentaeicosane-1,25-dioic acid		PEG1450.0001	1 g	€ 925,00
CAS-NO: 94376-75-7				
FORMULA: $C_{18}H_{34}O_{11}$				
MOLECULAR WEIGHT: 426,46 g/mole				
FURTHER INFORMATION: Spacer length 25 atoms or 28.8 A				
PEG3970	**NHS-dPEG™(7)-NHS**	PEG3970.0100	100 mg	€ 295,00
Bis-succinimidyl-4,7,10,13,16,19,22-heptaoxa pentacosane-1,25-dioate		PEG3970.1000	1 g	€ 575,00
CAS-NO: 1334170-02-3				
FORMULA: $C_{26}H_{40}N_2O_{15}$				
MOLECULAR WEIGHT: 620,6 g/mole				
FURTHER INFORMATION: Spacer length 25 atoms or 28.6 A				
PEG4060	**Pfp-dPEG™(7)-Pfp**	PEG4060.0100	100 mg	€ 295,00
alpha,omega-Bis(pentafluorphenyl propionate) hepta(ethylene glycol)		PEG4060.1000	1 g	€ 860,00
CAS-NO: 1334170-01-2				
FORMULA: $C_{30}H_{32}F_{10}O_{11}$				
MOLECULAR WEIGHT: 758,55 g/mole				
FURTHER INFORMATION: Spacer length 25 atoms or 28.6 A				
PEG1475	**HOOC-dPEG(9)-COOH**	PEG1475.0100	100 mg	€ 295,00
4,7,10,13,16,19,22,25,28-Nonaoxauntriacontane-1,31-dioic acid		PEG1475.0001	1 g	€ 1150,00
CAS-NO: 1268488-70-5				
FORMULA: $C_{22}H_{42}O_{13}$				
MOLECULAR WEIGHT: 514,56 g/mole				
FURTHER INFORMATION: Spacer length 31 atoms or 35.7 A				
PEG1460	**NHS-dPEG(9)-NHS**	PEG1460.0100	100 mg	€ 325,00
Bis-succinimidyl-4,7,10,13,16,19,22,25,28-nonaoxahentriacontane-1,31-dioate		PEG1460.0001	1 g	€ 610,00
CAS-NO: 1008402-79-6				
FORMULA: $C_{30}H_{48}N_2O_{17}$				
MOLECULAR WEIGHT: 708,71 g/mole				
FURTHER INFORMATION: Spacer length 31 atoms or 35.7 A				
PEG4070	**Pfp-dPEG™(9)-Pfp**	PEG4070.0100	100 mg	€ 325,00
alpha,omega-Bis(pentafluorphenyl propionate) nona(ethylene glycol)		PEG4070.1000	1 g	€ 1250,00
CAS-NO: 1334170-00-1				
FORMULA: $C_{34}H_{40}F_{10}O_{13}$				
MOLECULAR WEIGHT: 846,66 g/mole				
FURTHER INFORMATION: Spacer length 31 atoms or 35.8 A				
PEG1091	**HOOC-PEG(13)-COOH**	PEG1091.0001	1 g	€ 210,00
alpha,omega-Bis(propionic acid) tridecae(ethylene glycol)		PEG1091.0005	5 g	€ 675,00
CAS-NO: 892155-64-5				
FORMULA: $C_{30}H_{58}O_{17}$				
MOLECULAR WEIGHT: 690,77 g/mole				

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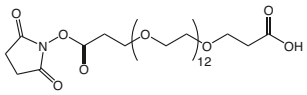
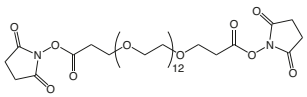
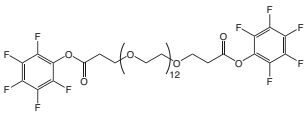
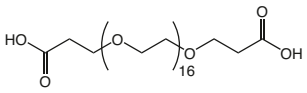
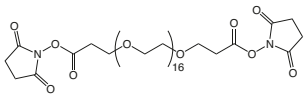
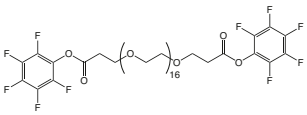
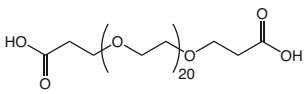
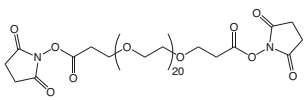
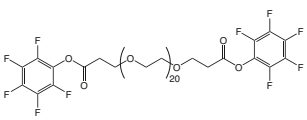
		Article No.	Quantity	Price
PEG5100	**NHS-dPEG™(13)-COOH**	PEG5100.0100	100 mg	€ 325,00
alpha-succinimidyl trideca(ethylene glycol)-alpha,omega-bispropionic acid FORMULA: $C_{34}H_{61}NO_{19}$ MOLECULAR WEIGHT: 787,84 g/mole FURTHER INFORMATION: Spacer length 43 atoms or 50.0 A		PEG5100.1000	1 g	€ 1475,00
PEG3980	**NHS-dPEG™(13)-NHS**	PEG3980.0100	100 mg	€ 355,00
alpha,omega-bis(succinimidyl propionate) dodeca(ethylene glycol) CAS-NO: 1008402-79-6 FORMULA: $C_{38}H_{64}N_2O_{21}$ MOLECULAR WEIGHT: 884,92 g/mole FURTHER INFORMATION: Spacer length 43 atoms or 50.1 A		PEG3980.1000	1 g	€ 825,00
PEG4080	**Pfp-dPEG™(13)-Pfp**	PEG4080.0100	100 mg	€ 355,00
alpha,omega-Bis(pentafluorphenyl propionate) trideca(ethylene glycol) CAS-NO: 1334170-00-1 FORMULA: $C_{42}H_{56}F_{10}O_{17}$ MOLECULAR WEIGHT: 1022,87 g/mole FURTHER INFORMATION: Spacer length 43 atoms or 50.0 A		PEG4080.1000	1 g	€ 1375,00
PEG4140	**HOOC-dPEG™(17)-COOH**	PEG4140.0100	100 mg	€ 355,00
alpha,omega-Bis(propionic acid) heptadeca(ethylene glycol) CAS-NO: 1268488-70-5 FORMULA: $C_{38}H_{74}O_{21}$ MOLECULAR WEIGHT: 866,98 g/mole FURTHER INFORMATION: Spacer length 55 atoms or 64.4 A		PEG4140.1000	1 g	€ 1375,00
PEG3990	**NHS-dPEG™(17)-NHS**	PEG3990.0100	100 mg	€ 385,00
alpha,omega-bis(succinimidyl propionate) hexadeca(ethylene glycol) CAS-NO: 1008402-79-6 FORMULA: $C_{46}H_{80}N_2O_{25}$ MOLECULAR WEIGHT: 1061,13 g/mole FURTHER INFORMATION: Spacer length 55 atoms or 64.4 A		PEG3990.1000	1 g	€ 1250,00
PEG4090	**Pfp-dPEG™(17)-Pfp**	PEG4090.0100	100 mg	€ 385,00
alpha,omega-Bis(pentafluorphenyl propionate) heptadeca(ethylene glycol) CAS-NO: 1334170-00-1 FORMULA: $C_{50}H_{72}F_{10}O_{21}$ MOLECULAR WEIGHT: 1199,08 g/mole FURTHER INFORMATION: Spacer length 55 atoms or 64.4 A		PEG4090.1000	1 g	€ 1450,00
PEG4150	**HOOC-dPEG™(21)-COOH**	PEG4150.0100	100 mg	€ 385,00
alpha,omega-Bis(propionic acid) 20(ethylene glycol) CAS-NO: 1268488-70-5 FORMULA: $C_{46}H_{90}O_{25}$ MOLECULAR WEIGHT: 1043,19 g/mole FURTHER INFORMATION: Spacer length 67 atoms or 79.1 A		PEG4150.1000	1 g	€ 1450,00
PEG4000	**NHS-dPEG™(21)-NHS**	PEG4000.0100	100 mg	€ 420,00
alpha,omega-bis(succinimidyl propionate) 20(ethylene glycol) CAS-NO: 1008402-79-6 FORMULA: $C_{54}H_{96}N_2O_{29}$ MOLECULAR WEIGHT: 1237,34 g/mole FURTHER INFORMATION: Spacer length 67 atoms or 79.1 A		PEG4000.1000	1 g	€ 1250,00
PEG4100	**Pfp-dPEG™(21)-Pfp**	PEG4100.0100	100 mg	€ 420,00
alpha,omega-Bis(pentafluorphenyl propionate) 21(ethylene glycol) CAS-NO: 1334170-00-1 FORMULA: $C_{58}H_{88}F_{10}O_{25}$ MOLECULAR WEIGHT: 1375,29 g/mole FURTHER INFORMATION: Spacer length 67 atoms or 78.7 A		PEG4100.1000	1 g	€ 1550,00

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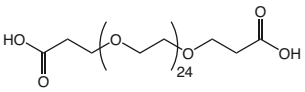
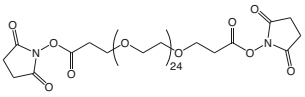
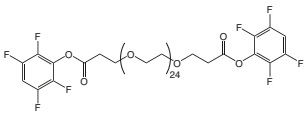
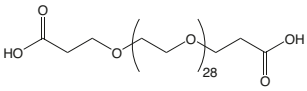
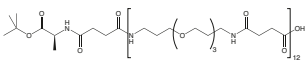
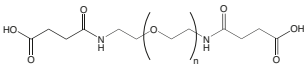
		Article No.	Quantity	Price
PEG4160 **HOOC-dPEG™(25)-COOH**		PEG4160.0100	100 mg	€ 420,00
alpha,omega-Bis(propionic acid) 24(ethylene glycol) CAS-NO: 1268488-70-5 FORMULA: $C_{54}H_{106}O_{29}$ MOLECULAR WEIGHT: 1219,4 g/mole FURTHER INFORMATION: Spacer length 79 atoms or 93.0 A		PEG4160.1000	1 g	€ 1550,00
PEG4010 **NHS-dPEG™(25)-NHS**		PEG4010.0100	100 mg	€ 455,00
alpha,omega-bis(succinimidyl propionate) 24(ethylene glycol) CAS-NO: 1008402-79-6 FORMULA: $C_{62}H_{112}N_2O_{33}$ MOLECULAR WEIGHT: 1413,55 g/mole FURTHER INFORMATION: Spacer length 79 atoms or 93.0 A		PEG4010.1000	1 g	€ 1275,00
PEG4110 **Tfp-dPEG™(25)-Tfp**		PEG4110.0100	100 mg	€ 455,00
alpha,omega-Bis(2,3,4,5-tetrafluorphenyl propionate) 25(ethylene glycol) FORMULA: $C_{66}H_{106}F_8O_{29}$ MOLECULAR WEIGHT: 1515,52 g/mole FURTHER INFORMATION: Spacer length 79 atoms or 93.0 A		PEG4110.1000	1 g	€ 1600,00
PEG1465 **HOOC-dPEG(29)-COOH**		PEG1465.0100	100 mg	€ 480,00
alpha,omega-Bis-carboxy-29(ethylene glycol) CAS-NO: 1268488-70-5 FORMULA: $C_{60}H_{118}O_{32}$ MOLECULAR WEIGHT: 1351,56 g/mole FURTHER INFORMATION: Spacer length 91 atoms or 106.4 A		PEG1465.1000	1 g	€ 1750,00
PEG1189 **tBu-O2C-PEG(12)-COOH**		PEG1189.0001	1 g	€ 280,00
alpha-Alanine-t-butyl ester omega carboxylic acid PEG-dodecamer (3869 Dalton) FORMULA: $C_{179}H_{331}N_{25}O_{65}$ MOLECULAR WEIGHT: 3873,76 g/mole		PEG1189.0005	5 g	€ 1000,00
		PEG1189.0025	25 g	€ 4000,00
PEG1083 **HOOC-PEG-COOH**		PEG1083.0001	1 g	€ 75,00
alpha,omega-Bis-carboxy poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1083.0005	5 g	€ 275,00
PEG1085 **HOOC-PEG-COOH**		PEG1085.0001	1 g	€ 75,00
alpha,omega-Bis-carboxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1085.0005	5 g	€ 275,00
PEG1086 **HOOC-PEG-COOH**		PEG1086.0001	1 g	€ 75,00
alpha,omega-Bis-carboxy poly(ethylene glycol) (PEG-MW 6.000 Dalton) MOLECULAR WEIGHT: 6000 Da		PEG1086.0005	5 g	€ 275,00
PEG1082 **HOOC-PEG-COOH**		PEG1082.0001	1 g	€ 75,00
alpha,omega-Bis-carboxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1082.0005	5 g	€ 275,00
PEG1084 **HOOC-PEG-COOH**		PEG1084.0001	1 g	€ 75,00
alpha,omega-Bis-carboxy poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1084.0005	5 g	€ 275,00

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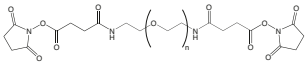
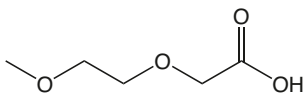
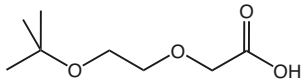
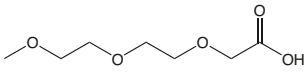
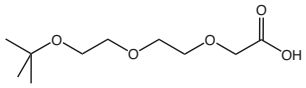
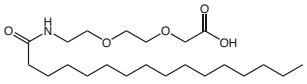
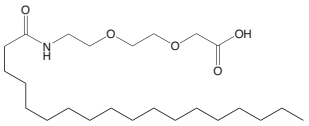
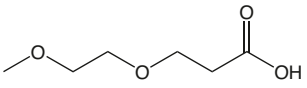
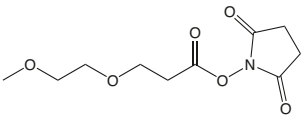
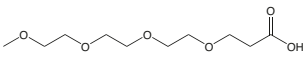
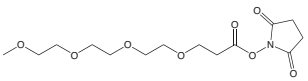
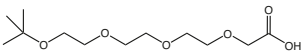
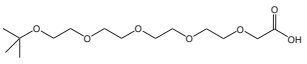
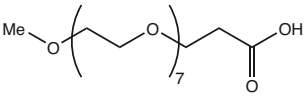
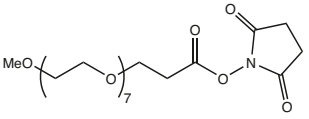
		Article No.	Quantity	Price
PEG1184 NHS-PEG-NHS alpha,omega-Di-succinimidyl ester poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1184.0001 PEG1184.0005	1 g 5 g	€ 165,00 € 560,00
PEG1186 NHS-PEG-NHS alpha,omega-Di-succinimidyl ester poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1186.0001 PEG1186.0005	1 g 5 g	€ 165,00 € 560,00
PEG1187 NHS-PEG-NHS alpha,omega-Di-succinimidyl ester poly(ethylene glycol) (PEG-MW 6.000 Dalton) MOLECULAR WEIGHT: 6000 Da		PEG1187.0001 PEG1187.0005	1 g 5 g	€ 165,00 € 560,00
PEG1183 NHS-PEG-NHS alpha,omega-Di-succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1183.0001 PEG1183.0005	1 g 5 g	€ 165,00 € 560,00
PEG1185 NHS-PEG-NHS alpha,omega-Di-succinimidyl ester poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1185.0001 PEG1185.0005	1 g 5 g	€ 165,00 € 560,00

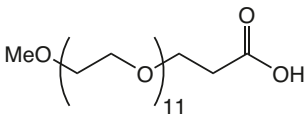
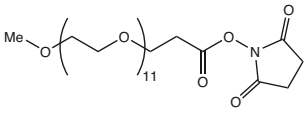
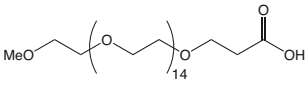
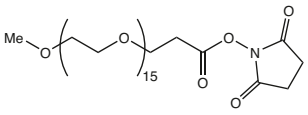
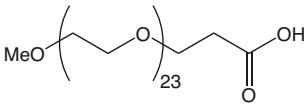
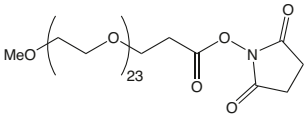
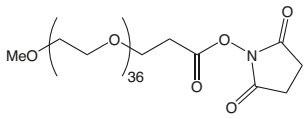
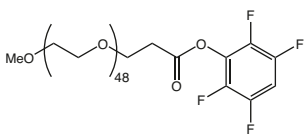
3.3.6 mPEG- and other Alkyl-PEG-Acids and Esters

PEG2020 DOHA 3,6-Dioxaheptaneoic acid CAS-NO: 16024-56-9 FORMULA: $C_5H_{10}O_4$ MOLECULAR WEIGHT: 134,13 g/mole		PEG2020.0005 PEG2020.0025 PEG2020.0100	5 g 25 g 100 g	€ 200,00 € 600,00 € 1800,00
PEG5240 tBuO-Ethoxyacetic acid 2-(2-t-butoxyethoxy)acetic acid CAS-NO: 1566691-57-3 FORMULA: $C_8H_{16}O_4$ MOLECULAR WEIGHT: 176,21 g/mole		PEG5240.0001 PEG5240.0005	1 g 5 g	€ 350,00 € 1400,00
PEG2025 TODA 3,6,9-Trioxadecanoic acid CAS-NO: 16024-58-1 FORMULA: $C_7H_{14}O_5$ MOLECULAR WEIGHT: 178,19 g/mole		PEG2025.0025 PEG2025.0100	25 g 100 g	€ 250,00 € 650,00
PEG5250 tBuO-EEA 2-(2-(2-t-butoxyethoxy)ethoxy)acetic acid FORMULA: $C_{10}H_{20}O_5$ MOLECULAR WEIGHT: 220,26 g/mole		PEG5250.0250 PEG5250.1000 PEG5250.5000	250 mg 1 g 5 g	€ 150,00 € 400,00 € 1500,00
PEG4990 Palm-AEEA {2-[2-(Palmitoyl-amino)ethoxy]ethoxy}acetic acid FORMULA: $C_{22}H_{43}NO_5$ MOLECULAR WEIGHT: 401,58 g/mole		PEG4990.0001 PEG4990.0005 PEG4990.0025	1 g 5 g 25 g	€ 135,00 € 500,00 € 2000,00

Prices are in EUR, net, exw Germany

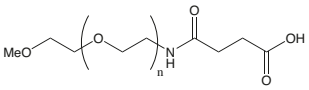
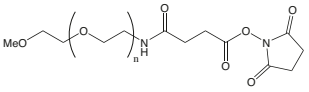
		Article No.	Quantity	Price
PEG1203 Stea-O2Oc-OH 8-(Stearoylamido)-3,6-dioxaoctanoic acid CAS-NO: 1006054-22-3 FORMULA: $C_{24}H_{47}NO_5$ MOLECULAR WEIGHT: 429,65 g/mole		PEG1203.0001 PEG1203.0005 PEG1203.0025	1 g 5 g 25 g	€ 135,00 € 500,00 € 2000,00
PEG1630 MeO-EPr-COOH 3-(2-Methoxyethoxy)propanoic acid, 4,7-Dioxa-octanoic acid CAS-NO: 149577-05-9 FORMULA: $C_6H_{12}O_4$ MOLECULAR WEIGHT: 148,16 g/mole FURTHER INFORMATION: Spacer length 8 atoms or 8.5 A		PEG1630.0100 PEG1630.0001	100 mg 1 g	€ 175,00 € 325,00
PEG1905 MeO-EPr-NHS 3-(2-Methoxyethoxy)propanoic acid succinimidyl ester CAS-NO: 1127247-34-0 FORMULA: $C_{10}H_{15}NO_6$ MOLECULAR WEIGHT: 245,23 g/mole FURTHER INFORMATION: Spacer length 8 atoms or 8.5 A		PEG1905.0100 PEG1905.0001	100 mg 1 g	€ 175,00 € 385,00
PEG1620 MeO-dPEG(3)-COOH 2,5,8,11-Tetraoxatetradecan-14-oic acid CAS-NO: 67319-28-2 FORMULA: $C_{10}H_{20}O_6$ MOLECULAR WEIGHT: 236,26 g/mole FURTHER INFORMATION: Spacer length 14 atoms or 15.6 A		PEG1620.0100 PEG1620.0001	100 mg 1 g	€ 175,00 € 385,00
PEG1880 MeO-dPEG(3)-NHS 2,5,8,11-Tetraoxatetradecan-14-oic acid succinimidyl ester CAS-NO: 622405-78-1 FORMULA: $C_{14}H_{23}NO_8$ MOLECULAR WEIGHT: 333,33 g/mole FURTHER INFORMATION: Spacer length 14 atoms or 15:6 A		PEG1880.0100 PEG1880.0001	100 mg 1 g	€ 175,00 € 515,00
PEG5260 tBuO-PEG(3)-COOH 2-(2-(2-(2-t-butoxyethoxy)ethoxy)ethoxy)acetic acid CAS-NO: 871085-87-9 FORMULA: $C_{12}H_{24}O_6$ MOLECULAR WEIGHT: 264,32 g/mole		please inquire!		
PEG5270 tBuO-PEG(4)-COOH 14-t-butoxy-3,6,9,12-tetraoxa-tetradecanoic acid FORMULA: $C_{14}H_{28}O_7$ MOLECULAR WEIGHT: 308,37 g/mole		please inquire!		
PEG1625 MeO-dPEG(8)-COOH 2,5,8,11,14,17,20,23-Octaoxahexacosan-26-oic acid CAS-NO: 1093647-41-6 FORMULA: $C_{18}H_{36}O_{10}$ MOLECULAR WEIGHT: 412,47 g/mole FURTHER INFORMATION: Spacer length 26 atoms or 29.8 A		PEG1625.0100 PEG1625.0001	100 mg 1 g	€ 235,00 € 515,00
PEG1885 MeO-dPEG(8)-NHS 2,5,8,11,14,17,20,23-Octaoxahexacosan-26-oic acid succinimidyl ester CAS-NO: 756525-90-3 FORMULA: $C_{22}H_{39}NO_{12}$ MOLECULAR WEIGHT: 509,54 g/mole FURTHER INFORMATION: Spacer length 26 atoms or 29.8 A		PEG1885.0100 PEG1885.0001	100 mg 1 g	€ 235,00 € 550,00

Prices are in EUR, net, exw Germany

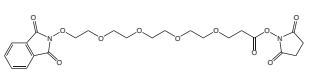
		Article No.	Quantity	Price
PEG1156	**MeO-PEG(12)-COOH**	PEG1156.0001	1 g	€ 400,00
2,5,8,11,14,17,20,23,26,29,32,35-Dodecaoxaoctatriacontan-38-oic acid FORMULA: $C_{26}H_{52}O_{14}$ MOLECULAR WEIGHT: 588,68 g/mole FURTHER INFORMATION: Spacer length 38 atoms or 44.0 A		PEG1156.0005	5 g	€ 1200,00
PEG1890	**MeO-dPEG(12)-NHS**	PEG1890.0100	100 mg	€ 235,00
2,5,8,11,14,17,20,23,26,29,32,35-Dodecaoxaoctatriacontan-38-oic acid succinimidyl ester CAS-NO: 756525-94-7 FORMULA: $C_{30}H_{55}NO_{16}$ MOLECULAR WEIGHT: 685,75 g/mole FURTHER INFORMATION: Spacer length 38 atoms or 44.0 A		PEG1890.0001	1 g	€ 695,00
PEG2370	**MeO-PEG(16)-COOH**	PEG2370.0100	100 mg	€ 300,00
alpha-Methoxy-omega-carboxy hexadeca(ethylene glycol) FORMULA: $C_{34}H_{68}O_{18}$ MOLECULAR WEIGHT: 764,89 g/mole FURTHER INFORMATION: Spacer length 50 atoms or 57.9 A		PEG2370.0001	1 g	€ 775,00
PEG1895	**MeO-dPEG(16)-NHS**			please inquire!
alpha-Methoxy-15(ethylene glycol)-omega-propionic acid succinimidyl ester CAS-NO: 756525-94-7 FORMULA: $C_{38}H_{71}NO_{20}$ MOLECULAR WEIGHT: 861,98 g/mole FURTHER INFORMATION: Spacer length 50 atoms or 57.9 A				
PEG1635	**MeO-dPEG(24)-COOH**	PEG1635.0100	100 mg	€ 295,00
alpha-Methoxy-23(ethylene glycol)-omega-propionic acid FORMULA: $C_{50}H_{100}O_{26}$ MOLECULAR WEIGHT: 1117,31 g/mole FURTHER INFORMATION: Spacer length 74 atoms or 86.2 A		PEG1635.0001	1 g	€ 1000,00
PEG1900	**MeO-dPEG(24)-NHS**	PEG1900.0100	100 mg	€ 295,00
alpha-Methoxy-23(ethylene glycol)-omega-propionic acid succinimidyl ester CAS-NO: 756525-94-7 FORMULA: $C_{54}H_{103}NO_{28}$ MOLECULAR WEIGHT: 1214,39 g/mole FURTHER INFORMATION: Spacer length 74 atoms or 86.2 A		PEG1900.0001	1 g	€ 1425,00
PEG3190	**MeO-dPEG™(37)-NHS**	PEG3190.0100	100 mg	€ 420,00
alpha-Methoxy-37(ethylene glycol)-omega-propionic acid succinimidyl ester CAS-NO: 756525-94-7 FORMULA: $C_{80}H_{155}NO_{41}$ MOLECULAR WEIGHT: 1786,07 g/mole FURTHER INFORMATION: Spacer length 112 atoms or 133.9 A		PEG3190.1000	1 g	€ 1500,00
PEG3201	**MeO-dPEG™(49)-TFP**	PEG3201.0100	100 mg	€ 500,00
alpha-Methoxy-49(ethylen glycol)-omega-propionic acid tetrafluorophenyl ester FORMULA: $C_{106}H_{200}F_4O_{51}$ MOLECULAR WEIGHT: 2366,69 g/mole FURTHER INFORMATION: Spacer length 150 atoms or 177.7 A		PEG3201.1000	1 g	€ 1850,00

Other NHS-PEG derivatives available on custom synthesis basis.

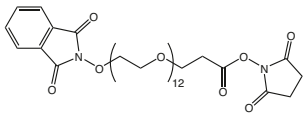
Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG1161 **MeO-PEG-COOH**		PEG1161.0001	1 g	€ 120,00
alpha-Methoxy-omega-carboxylic acid poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 Da		PEG1161.0005	5 g	€ 450,00
PEG1158 **MeO-PEG-COOH**		PEG1158.0001	1 g	€ 75,00
alpha-Methoxy-omega-carboxylic acid poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1158.0005	5 g	€ 275,00
PEG1160 **MeO-PEG-COOH**		PEG1160.0001	1 g	€ 75,00
alpha-Methoxy-omega-carboxylic acid poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1160.0005	5 g	€ 275,00
PEG1157 **MeO-PEG-COOH**		PEG1157.0001	1 g	€ 90,00
alpha-Methoxy-omega-carboxylic acid poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1157.0005	5 g	€ 350,00
PEG1159 **MeO-PEG-COOH**		PEG1159.0001	1 g	€ 90,00
alpha-Methoxy-omega-carboxylic acid poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1159.0005	5 g	€ 350,00
PEG1166 **MeO-PEG-NHS**		PEG1166.0001	1 g	€ 225,00
alpha-Methoxy-omega-carboxylic acid succinimidyl ester poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 Da		PEG1166.0005	5 g	€ 725,00
PEG1163 **MeO-PEG-NHS**		PEG1163.0001	1 g	€ 175,00
alpha-Methoxy-omega-carboxylic acid succinimidyl ester poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1163.0005	5 g	€ 575,00
PEG1165 **MeO-PEG-NHS**		PEG1165.0001	1 g	€ 175,00
alpha-Methoxy-omega-carboxylic acid succinimidyl ester poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1165.0005	5 g	€ 575,00
		PEG1165.0025	25 g	€ 1950,00
PEG1162 **MeO-PEG-NHS**		PEG1162.0001	1 g	€ 200,00
alpha-Methoxy-omega-carboxylic acid succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1162.0005	5 g	€ 700,00
PEG1164 **MeO-PEG-NHS**		PEG1164.0001	1 g	€ 200,00
alpha-Methoxy-omega-carboxylic acid succinimidyl ester poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1164.0005	5 g	€ 700,00

3.3.7 Phthalimidoxy-PEG-Acids

PEG5080 **Phth-NO-dPEG™(4)-NHS**		PEG5080.0100	100 mg	€ 175,00
1-Phthalimidoxy-3,6,9,12-tetraoxapentadecan-15-oic acid succinimdyl ester FORMULA: $C_{23}H_{28}N_2O_{11}$ MOLECULAR WEIGHT: 508,48 g/mole FURTHER INFORMATION: Spacer length 17 atoms or 19.0 A		PEG5080.1000	1 g	€ 860,00

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG4630	**Phth-NO-dPEG™(12)-NHS**	PEG4630.0100	100 mg	€ 325,00
alpha-Pthaloylaminoxy-omega-(succinimidyl propionate)-dodeca(ethylene glycol) FORMULA: $C_{39}H_{60}N_2O_{19}$ MOLECULAR WEIGHT: 860,90 g/mole		PEG4630.1000	1 g	€ 1425,00

Phthalimidoxy-PEG-Acids form stable oxime conjugates useful in formation of glycolconjugates with oligonucleotides or protein-polysaccaride conjugates.

References:

- Site-specific chemical modification of recombinant proteins produced in mammalian cells by using the genetically encoded aldehyde tag; P. Wu, W. Shui, B. L. Carlson, N. Hu, D. Rabuka, J. Lee and C. R. Bertozzi; *Proc Natl Acad Sci U S A* 2009; **106**: 3000-3005. doi:10.1073/pnas.0807820106
- Synthesis of Oligonucleotide Glycoconjugates Using Sequential Click and Oximation Ligations; M. Karskela, M. Helkearo, P. Virta and H. Lönnberg; *Bioconjug Chem* 2010; **21**: 748-755. doi:10.1021/bc900529g
- Site-Specific Modification of Recombinant Proteins: A Novel Platform for Modifying Glycoproteins Expressed in E. coli; G. E. Henderson, K. D. Isett and T. U. Gerngross; *Bioconjug Chem* 2011; **22**: 903-912. doi:10.1021/bc100510g
- Efficient Surface Patterning of Oligonucleotides Inside a Glass Capillary through Oxime Bond Formation; N. Dendane, A. Hoang, L. Guillard, E. Defrancq, F. Vinet and P. Dumy; *Bioconjug Chem* 2007; **18**: 671-676. doi:10.1021/bc060254v
- Versatile and efficient synthesis of protein–polysaccharide conjugate vaccines using aminooxy reagents and oxime chemistry; A. Lees, G. Sen and A. LopezAcosta; *Vaccine* 2006; **24**: 716-729. doi:10.1016/j.vaccine.2005.08.096

3.3.8 Dye Labeled PEG-Acids

Dyes normally have an extended aromatic and therefore mostly hydrophobic ring system. The incorporation of PEG spacer furnishes this class of molecules with good water solubility.

They are used for protein or peptide labeling via direct coupling to amino functions.

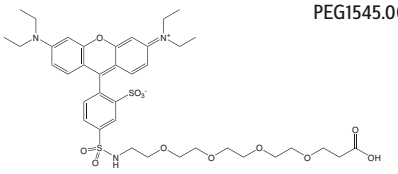
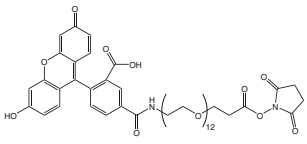
Protocol for in situ activation:

Use a 10-20% molar excess of EDC and NHS in dry methylene chloride (dried over 3 A molecular sieves). Add a methylene chloride solution of the acid to the dry reagents under dry conditions. Stir for several hours or overnight. Then evaporate the solvent and use.

Alternatively the reaction mixture can be treated with silica gel to adsorb excess of EDC and urea. Filter, then evaporate the solvent and use.

The NHS should be added together with the EDC, in order to prevent formation of anhydrides.

Plenty of alternative methods work equally well, like activation with DSC (N,N'-disuccinimidyl carbonate) and TEA or carbodiimides other than EDC (e.g. DIC, DCC).

		Article No.	Quantity	Price
PEG1545	**Rhodamine B-dPEG(4)-COOH**	PEG1545.0010	10 mg	€ 235,00
1-(Rhodamin B-sulfonamido)-3-oxo-7,10,13,16-tetraoxa-4-azanonade-can-19-oic acid CAS-NO: 1334177-85-3 FORMULA: $C_{38}H_{51}N_3O_{12}S_2$ MOLECULAR WEIGHT: 805,95 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18 A				
PEG5160	**Fluorescein-dPEG™(12)-NHS**	PEG5160.0005	5 mg	€ 325,00
alpha-Carboxyfluorescein-omega-(succinimidyl propionate) dodeca(ethylene glycol) FORMULA: $C_{52}H_{68}N_2O_{22}$ MOLECULAR WEIGHT: 1073,1 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 47.4 A		PEG5160.0010	10 mg	€ 525,00
		PEG5160.0100	100 mg	€ 2850,00

For more Dyes and Fluorescence labels from Violet to NIR visit our website

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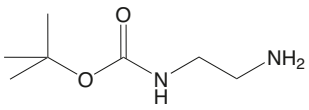
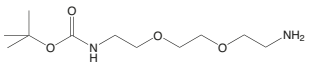
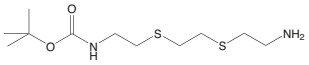
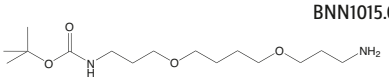
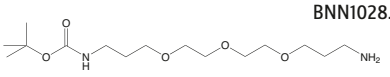
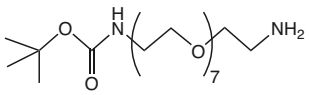
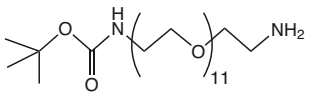
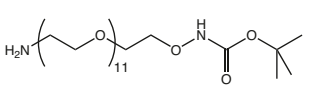
3.4 PEG-Amines, Hydrazines and Guanidines

3.4.1 Mono Protected PEG-Diamines

		Article No.	Quantity	Price
BNN1017 **Boc-EDA*HCl** N-t-Butyloxycarbonyl-ethylenediamine hydrochloride CAS-NO: 79513-35-2 FORMULA: $C_7H_{16}N_2O_2$*HCl MOLECULAR WEIGHT: 160,2*36,45 g/mole		BNN1017.0005 BNN1017.0025	5 g 25 g	€ 150,00 € 600,00
BNN1016 **Boc-DOOA** 1-(t-Butyloxycarbonyl-amino)-3,6-dioxa-8-octaneamine, liq. CAS-NO: 153086-78-3 FORMULA: $C_{11}H_{24}N_2O_4$ MOLECULAR WEIGHT: 248,32 g/mole		BNN1016.0001 BNN1016.0005 BNN1016.0025	1 g 5 g 25 g	€ 80,00 € 275,00 € 1100,00
BNN1058 **Boc-DSOA*HCl** 1-(t-Butyloxycarbonyl-amino)-3,6-dithio-8-octaneamine hydrochloride CAS-NO: 1301739-93-4 FORMULA: $C_{11}H_{24}N_2O_2S_2$*HCl MOLECULAR WEIGHT: 280,45*36,45 g/mole		BNN1058.0001 BNN1058.0005	1 g 5 g	€ 250,00 € 1000,00
BNN1015 **Boc-DODA** 1-(t-Butyloxycarbonyl-amino)-4,9-dioxa-12-dodecanamine, liq. CAS-NO: 275823-77-3 FORMULA: $C_{15}H_{32}N_2O_4$ MOLECULAR WEIGHT: 304,43 g/mole		BNN1015.0001 BNN1015.0005 BNN1015.0025	1 g 5 g 25 g	€ 100,00 € 300,00 € 1200,00
BNN1028 **Boc-TOTA** 1-(t-Butyloxycarbonyl-amino)-4,7,10-trioxa-13-tridecanamine, liq. CAS-NO: 194920-62-2 FORMULA: $C_{15}H_{32}N_2O_5$ MOLECULAR WEIGHT: 320,43 g/mole FURTHER INFORMATION: Spacer is 15 atoms or 16.9 A		BNN1028.0001 BNN1028.0005 BNN1028.0025	1 g 5 g 25 g	€ 100,00 € 300,00 € 1200,00
PEG1066 **Boc-NH-PEG(8)-NH_2** alpha-Amino-omega-Boc-amino-octa(ethylene glycol) CAS-NO: 206265-98-7 FORMULA: $C_{21}H_{44}N_2O_9$ MOLECULAR WEIGHT: 468,59 g/mole		PEG1066.0001 PEG1066.0005	1 g 5 g	€ 490,00 € 1650,00
PEG1065 **Boc-NH-PEG(11)-NH_2** alpha-Amino-omega-Boc-amino-undecae(ethylene glycol) CAS-NO: 890091-42-6 FORMULA: $C_{29}H_{60}N_2O_{13}$ MOLECULAR WEIGHT: 644,81 g/mole FURTHER INFORMATION: Spacer length 37 atoms or 42.8 A		PEG1065.0001 PEG1065.0005	1 g 5 g	€ 490,00 € 1650,00

The following **bis-carbonly reactive PEG crosslinker** can be used to conjugate two different aldehyde containing targets.

Aldehyde functions are present in carbohydrates, carbohydrate containing proteins and in oxidizable matrices. Amino functions, however, can also be converted to aldehydes with formyl-PEG-active esters or simply with glutardialdehyde.

		Article No.	Quantity	Price
PEG4660 **Amino-dPEG™(11)-aminoxy-Boc** alpha-Amino-omega-(t-butyloxycarbonyl-aminoxy)-undeca(ethylene glycol) FORMULA: $C_{29}H_{60}N_2O_{14}$ MOLECULAR WEIGHT: 660,79 g/mole		PEG4660.0100 PEG4660.1000	100 mg 1 g	€ 325,00 € 1375,00

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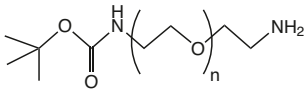
		Article No.	Quantity	Price
PEG1068	**Boc-NH-PEG-NH_2**	PEG1068.0500	500 mg	€ 175,00
alpha-t-Butyloxycarbonylamino-omega-amino poly(ethylene glycol) (PEG-MW 3.000 Dalton)		PEG1068.0001	1 g	€ 275,00
MOLECULAR WEIGHT: 3000 Da				
PEG1069	**Boc-NH-PEG-NH_2**	PEG1069.0500	500 mg	€ 175,00
alpha-t-Butyloxycarbonylamino-omega-amino poly(ethylene glycol) (PEG-MW 5.000 Dalton)		PEG1069.0001	1 g	€ 275,00
MOLECULAR WEIGHT: 5000 Da				
PEG1067	**Boc-NH-PEG-NH_2**	PEG1067.0500	500 mg	€ 225,00
alpha-t-Butyloxycarbonylamino-omega-amino poly(ethylene glycol) (PEG-MW 10.000 Dalton)		PEG1067.0001	1 g	€ 325,00
MOLECULAR WEIGHT: 10000 Da				

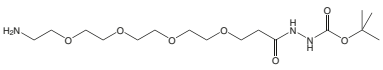
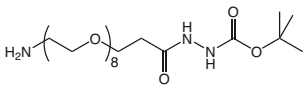
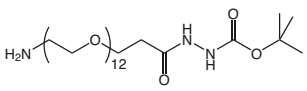
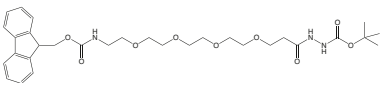
Orthogonal bis-carbonyl/carboxyl reactive PEGylating reagent.

The amine terminus of the following PEGs can react with either an acid/active ester or a carbonyl (aldehyde or ketone). The hydrazide (after Boc removal) can react with carboxyl or carbonyl moieties (aldehyde/ketone). The Boc group is removed with TFA (25% TFA in DCM, 0°C or near RT, 10 min).

The hydrazone formed from the incipient hydrazide can be used as a cleavable linking site, as the hydrazone is stable at pH above 7, and can be cleaved under acid pH.

The hydrazone can then be used as a release point in a delivery system, for example. The Boc protected hydrazide is not particularly water soluble, but is very soluble in most organic solvents, however, its inherent hydrophilicity is high once incorporated as a conjugated system.

When incorporated, the spacer will increase water solubility and reduce aggregation while remaining nonimmunogenic and non-toxic.

		Article No.	Quantity	Price
PEG1335	**H_2N-dPEG(4)-NHNH-Boc**	PEG1335.0100	100 mg	€ 225,00
15-Amino-4,7,10,13-tetraoxa-pentadecanoyl-N'-(t-butyloxycarbonyl)-hydrazid		PEG1335.0001	1 g	€ 860,00
CAS-NO: 1263047-17-1				
FORMULA: $C_{16}H_{33}N_3O_7$				
MOLECULAR WEIGHT: 379,45 g/mole				
PEG4230	**H_2N-dPEG™(8)-NHNH-Boc**	PEG4230.0100	100 mg	€ 325,00
alpha-Amino-omega-(N'-(t-butyloxycarbonyl)hydrazido propionate) octa(ethylene glycol)		PEG4230.1000	1 g	€ 1100,00
CAS-NO: 1334169-96-8				
FORMULA: $C_{24}H_{49}N_3O_{11}$				
MOLECULAR WEIGHT: 555,66 g/mole				
FURTHER INFORMATION: Spacer length 30 atoms or 35.9 A				
PEG4240	**H_2N-dPEG™(12)-NHNH-Boc**	PEG4240.0100	100 mg	€ 385,00
alpha-Amino-omega-(N'-(t-butyloxycarbonyl)hydrazido propionate) dodeca(ethylene glycol)		PEG4240.1000	1 g	€ 1200,00
CAS-NO: 1334169-97-9				
FORMULA: $C_{32}H_{65}N_3O_{15}$				
MOLECULAR WEIGHT: 731,87 g/mole				
FURTHER INFORMATION: Spacer length 45 atoms or 50.1 A				
PEG1805	**Fmoc-NH-dPEG(4)-NHNH-Boc**	PEG1805.0100	100 mg	€ 235,00
15-(9-Fluorenyloxycarbonyl)amino-4,7,10,13-tetraoxa-pentadecanoyl-N'-(t-butyloxycarbonyl)hydrazid		PEG1805.0001	1 g	€ 860,00
CAS-NO: 1263044-77-4				
FORMULA: $C_{31}H_{43}N_3O_9$				
MOLECULAR WEIGHT: 601,69 g/mole				
FURTHER INFORMATION: Spacer length 18 atoms or 21.1 A				

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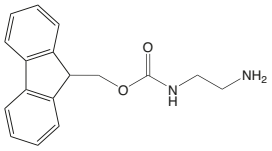
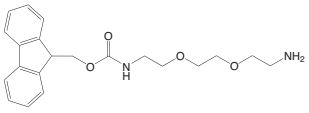
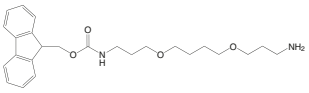
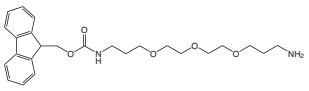
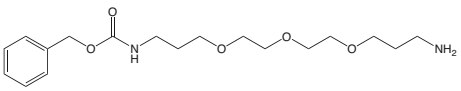
		Article No.	Quantity	Price
FNN1008 Fmoc-EDA*HCl N1-(9-Fluorenylmethyloxycarbonyl)-ethylenediamine hydrochloride CAS-NO: 166410-32-8 FORMULA: $C_{17}H_{18}N_2O_2$*HCl MOLECULAR WEIGHT: 318,8 g/mole		FNN1008.0005 FNN1008.0025	5 g 25 g	€ 175,00 € 700,00
FNN1007 Fmoc-DOOA*HCl 1-(9-Fluorenylmethyloxycarbonyl-amino)-3,6-dioxa-8-octaneamine hydrochloride CAS-NO: 868599-73-9 FORMULA: $C_{21}H_{26}N_2O_4$*HCl MOLECULAR WEIGHT: 370,45*36,45 g/mole		FNN1007.0001 FNN1007.0005 FNN1007.0025	1 g 5 g 25 g	€ 100,00 € 350,00 € 1400,00
FNN1006 Fmoc-DODA*HCl 1-(9-Fluorenylmethyloxycarbonyl-amino)-4,9-dioxa-12-dodecaneamine hydrochloride FORMULA: $C_{25}H_{34}N_2O_4$*HCl MOLECULAR WEIGHT: 426,56*36,45 g/mole		FNN1006.0001 FNN1006.0005 FNN1006.0025	1 g 5 g 25 g	€ 110,00 € 375,00 € 1500,00
FNN1011 Fmoc-TOTA*HCl 1-(9-Fluorenylmethyloxycarbonyl-amino)-4,7,10-trioxa-13-tridecanamine hydrochloride CAS-NO: 868599-75-1 FORMULA: $C_{25}H_{34}N_2O_5$*HCl MOLECULAR WEIGHT: 442,56*36,45 g/mole		FNN1011.0001 FNN1011.0005 FNN1011.0025	1 g 5 g 25 g	€ 110,00 € 400,00 € 1600,00

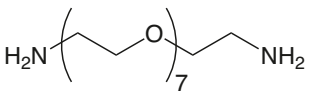
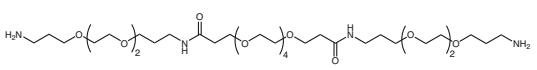
Z-protected amino-PEG-acids are typically applied in solution synthesis for incorporating a PEG unit using standard Cbz-chemistry, either as a spacer or as a terminal group in peptide sequences.

The Cbz or Z protecting group is deprotected by hydrogenolysis using catalytic Pd/C.

PEG spacers provide water solubility, reduce or eliminate aggregation, and are inherently non-immunogenic and non-toxic.

		Article No.	Quantity	Price
PEG1745 Z-NH-dPEG(3)-NH_2 3-(2-(2-(3-Benzyloxycarbonylaminopropoxy)ethoxy)ethoxy)propylamine CAS-NO: 220156-99-0 FORMULA: $C_{18}H_{30}N_2O_5$ MOLECULAR WEIGHT: 354,44 g/mole FURTHER INFORMATION: Spacer length 15 atoms or 16.9 A		PEG1745.0001	1 g	€ 480,00

3.4.2 Unprotected PEG-Diamines

		Article No.	Quantity	Price
PEG1204 H_2N-PEG(7)-NH_2 alpha,omega-Bis-amino octa(ethylene glycol) FORMULA: $C_{16}H_{36}N_2O_7$ MOLECULAR WEIGHT: 368,47 g/mole		PEG1204.0005	5 g	€ 500,00
PEG1500 H_2N-dPEG(11)-NH_2 N1,N19-bis(3-(2-(2-(3-aminopropoxy)ethoxy)ethoxy)propyl)-4,7,10,13,16-pentaoxanonadecane-1,19-diamide CAS-NO: 1224728-09-9 FORMULA: $C_{34}H_{70}N_4O_{13}$ MOLECULAR WEIGHT: 742,94 g/mole FURTHER INFORMATION: Spacer length 49 atoms or 57.1 A		PEG1500.0100 PEG1500.0001	100 mg 1 g	€ 225,00 € 925,00

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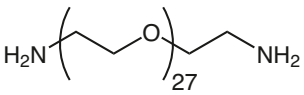
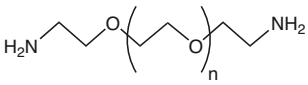
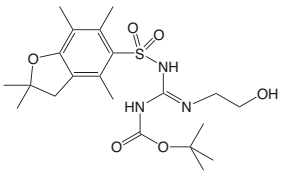
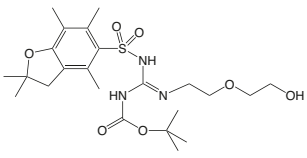
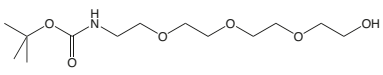
		Article No.	Quantity	Price
PEG2001 H_2N-PEG(27)-NH_2		PEG2001.0001	1 g	€ 250,00
alpha,omega-Bis-amino 27(ethylene glycol) CAS-NO: 892154-56-2 FORMULA: $C_{56}H_{116}N_2O_{27}$ MOLECULAR WEIGHT: 1249,52 g/mole		PEG2001.0005	5 g	€ 750,00
PEG1002 H_2N-PEG-NH_2		PEG1002.0001	1 g	€ 75,00
alpha,omega-Bis-amino poly(ethylene glycol) (PEG-MW 2.000 Dalton) CAS-NO: 24991-53-5 MOLECULAR WEIGHT: 2000 Da		PEG1002.0005	5 g	€ 275,00
PEG1004 H_2N-PEG-NH_2		PEG1004.0001	1 g	€ 75,00
alpha,omega-Bis-amino poly(ethylene glycol) (PEG-MW 3.000 Dalton) CAS-NO: 24991-53-5 MOLECULAR WEIGHT: 3000 Da		PEG1004.0005	5 g	€ 275,00
PEG1005 H_2N-PEG-NH_2		PEG1005.0001	1 g	€ 75,00
alpha,omega-Bis-amino poly(ethylene glycol) (PEG-MW 6.000 Dalton) CAS-NO: 24991-53-5 MOLECULAR WEIGHT: 6000 Da		PEG1005.0005	5 g	€ 275,00
PEG1001 H_2N-PEG-NH_2		PEG1001.0001	1 g	€ 75,00
alpha,omega-Bis-amino poly(ethylene glycol) (PEG-MW 10.000 Dalton) CAS-NO: 24991-53-5 MOLECULAR WEIGHT: 10000 Da		PEG1001.0005	5 g	€ 275,00
PEG1003 H_2N-PEG-NH_2		PEG1003.0001	1 g	€ 75,00
alpha,omega-Bis-amino poly(ethylene glycol) (PEG-MW 20.000 Dalton) CAS-NO: 24991-53-5 MOLECULAR WEIGHT: 20000 Da		PEG1003.0005	5 g	€ 275,00

3.4.3 Amino-PEG-Alcohols

BAL1048 Boc,Pbf-amidino-EtOH		BAL1048.0001	1 g	€ 75,00
2-[N-t-Butyloxycarbonyl-N'-(2,2,4,6,7-pentamethyldihydrobenzo-furan-5-sulfonyl)amidino]ethanol CAS-NO: 1263048-99-2 FORMULA: $C_{21}H_{33}N_3O_6S$ MOLECULAR WEIGHT: 455,57 g/mole		BAL1048.0005	5 g	€ 300,00
		BAL1048.0025	25 g	€ 1200,00
BAL1047 Boc,Pbf-amidino-EEtOH		BAL1047.0001	1 g	€ 75,00
2-{2-[N-t-Butyloxycarbonyl-N'-(2,2,4,6,7-pentamethyldihydrobenzo-furan-5-sulfonyl)amidino]ethoxy}ethanol CAS-NO: 1263049-12-2 FORMULA: $C_{23}H_{37}N_3O_7S$ MOLECULAR WEIGHT: 499,61 g/mole		BAL1047.0005	5 g	€ 300,00
		BAL1047.0025	25 g	€ 1200,00
PEG1915 Boc-NH-dPEG(4)-OH		PEG1915.0100	100 mg	€ 75,00
2-(2-(2-(2-(t-Butyloxycarbonylamino)ethoxy)ethoxy)ethoxy)ethanol CAS-NO: 106984-09-2 FORMULA: $C_{13}H_{27}NO_6$ MOLECULAR WEIGHT: 293,36 g/mole FURTHER INFORMATION: Spacer length 13 atoms or 14.3 A		PEG1915.0001	1 g	€ 250,00

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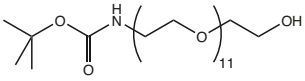
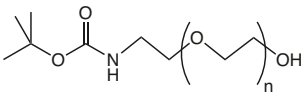
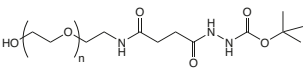
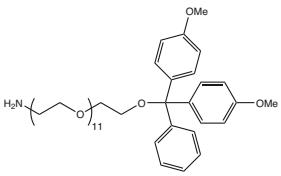
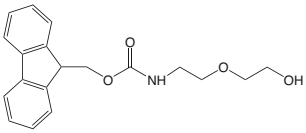
		Article No.	Quantity	Price
PEG1960 Boc-NH-dPEG(12)-OH 35-(t-Butyloxycarbonylamino)-3,6,9,12,15,18,21,24,27,30,33-un-decaoxapentatriacontan-1-ol CAS-NO: 159156-95-3 FORMULA: $C_{29}H_{59}NO_{14}$ MOLECULAR WEIGHT: 645,78 g/mole FURTHER INFORMATION: Spacer length 38 atoms or 42.7 A		PEG1960.0100 PEG1960.0001	100 mg 1 g	€ 295,00 € 1025,00
PEG1021 Boc-NH-PEG-OH alpha-t-Butyloxycarbonylamino-omega-hydroxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1021.0500 PEG1021.0001 PEG1021.0005	500 mg 1 g 5 g	€ 175,00 € 290,00 € 1160,00
PEG1022 Boc-NH-PEG-OH alpha-t-Butyloxycarbonylamino-omega-hydroxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1022.0500 PEG1022.0001	500 mg 1 g	€ 175,00 € 290,00
PEG1020 Boc-NH-PEG-OH alpha-t-Butyloxycarbonylamino-omega-hydroxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1020.0500 PEG1020.0001	500 mg 1 g	€ 225,00 € 360,00
PEG1030 HO-PEG-CONH-NH-Boc alpha-Hydroxy-omega-t-butyloxycarbonyl-hydrazido poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1030.0500 PEG1030.0001	500 mg 1 g	€ 230,00 € 380,00
PEG1031 HO-PEG-CONH-NH-Boc alpha-Hydroxy-omega-t-butyloxycarbonyl-hydrazido poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1031.0500 PEG1031.0001	500 mg 1 g	€ 230,00 € 380,00
PEG1029 HO-PEG-CONH-NH-Boc alpha-Hydroxy-omega-t-butyloxycarbonyl-hydrazido poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1029.0500 PEG1029.0001	500 mg 1 g	€ 275,00 € 430,00

PEG1315 is a carbonyl and carboxyl reactive PEGylating reagent that reacts with acids, active esters and aldehydes/ ketones. The DMT (4,4'-dimethoxytrityl) protected hydroxyl function can be deprotected with mild acid, including TFE (triflouroethanol).

		Article No.	Quantity	Price
PEG1315 H_2N-dPEG(12)-O-DMT 35-Amino-3,6,9,12,15,18,21,24,27,30,33-undecaoxapentatria-contan-1-(4,4'-dimethoxytrityl)ether CAS-NO: 879571-23-0 FORMULA: $C_{45}H_{69}NO_{14}$ MOLECULAR WEIGHT: 848,03 g/mole		PEG1315.0100 PEG1315.0001	100 mg 1 g	€ 295,00 € 1025,00
FAL3010 Fmoc-O1Pen-ol 5-(9-Fluorenylmethyloxycarbonyl-amino)-3-oxa-1-pentanol CAS-NO: 560088-66-6 FORMULA: $C_{19}H_{21}NO_4$ MOLECULAR WEIGHT: 327,37 g/mole		FAL3010.0005 FAL3010.0025	5 g 25 g	€ 125,00 € 500,00

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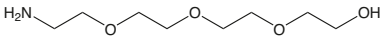
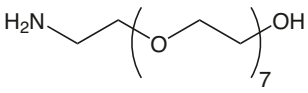
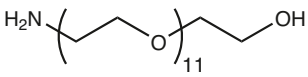
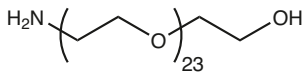
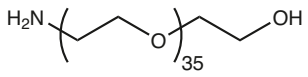
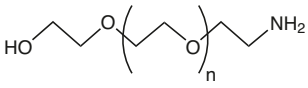
		Article No.	Quantity	Price
PEG1320 **H_2N-PEG(4)-OH**		PEG1320.0100	100 mg	€ 175,00
2-(2-(2-(2-Aminoethoxy)ethoxy)ethoxy)ethanol CAS-NO: 86770-74-3 FORMULA: $C_8H_{19}NO_4$ MOLECULAR WEIGHT: 193,24 g/mole FURTHER INFORMATION: Spacer length 13 atoms or 14.3 A		PEG1320.0001	1 g	€ 270,00
		PEG1320.0005	5 g	€ 800,00
PEG1340 **H_2N-dPEG(8)-OH**		PEG1340.0100	100 mg	€ 225,00
23-Amino-3,6,9,12,15,18,21-heptaoxatrieicosane-1-ol CAS-NO: 352439-37-3 FORMULA: $C_{16}H_{35}NO_8$ MOLECULAR WEIGHT: 369,45 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.1 A		PEG1340.0001	1 g	€ 575,00
PEG1310 **H_2N-dPEG(12)-OH**		PEG1310.0100	100 mg	€ 265,00
35-Amino-3,6,9,12,15,18,21,24,27,30,33-undecaoxapentatriacontan-1-ol CAS-NO: 933789-97-0 FORMULA: $C_{24}H_{51}NO_{12}$ MOLECULAR WEIGHT: 545,66 g/mole FURTHER INFORMATION: Spacer length 38 atoms or 42.7 A		PEG1310.0001	1 g	€ 850,00
PEG3740 **H_2N-dPEG™(24)-OH**		PEG3740.0100	100 mg	€ 325,00
alpha-Amino-omega-hydroxy 24(ethylene glycol) CAS-NO: 933789-97-0 FORMULA: $C_{48}H_{99}NO_{24}$ MOLECULAR WEIGHT: 1074,29 g/mole FURTHER INFORMATION: Spacer length 71 atoms or 86.0 A		PEG3740.1000	1 g	€ 1100,00
PEG3750 **H_2N-dPEG™(36)-OH**		PEG3750.0100	100 mg	€ 455,00
alpha-Amino-omega-hydroxy 36(ethylene glycol) CAS-NO: 933789-97-0 FORMULA: $C_{72}H_{147}NO_{36}$ MOLECULAR WEIGHT: 1602,92 g/mole FURTHER INFORMATION: Spacer length 107 atoms or 129.0 A		PEG3750.1000	1 g	€ 1350,00
PEG1007 **H_2N-PEG-OH**		PEG1007.0500	500 mg	€ 135,00
alpha-Amino-omega-hydroxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) CAS-NO: 32130-27-1 MOLECULAR WEIGHT: 3000 Da		PEG1007.0001	1 g	€ 225,00
PEG1008 **H_2N-PEG-OH**		PEG1008.0500	500 mg	€ 175,00
alpha-Amino-omega-hydroxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) CAS-NO: 32130-27-1 MOLECULAR WEIGHT: 5000 Da		PEG1008.0001	1 g	€ 275,00
PEG1006 **H_2N-PEG-OH**		PEG1006.0500	500 mg	€ 175,00
alpha-Amino-omega-hydroxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) CAS-NO: 32130-27-1 MOLECULAR WEIGHT: 10000 Da		PEG1006.0001	1 g	€ 275,00

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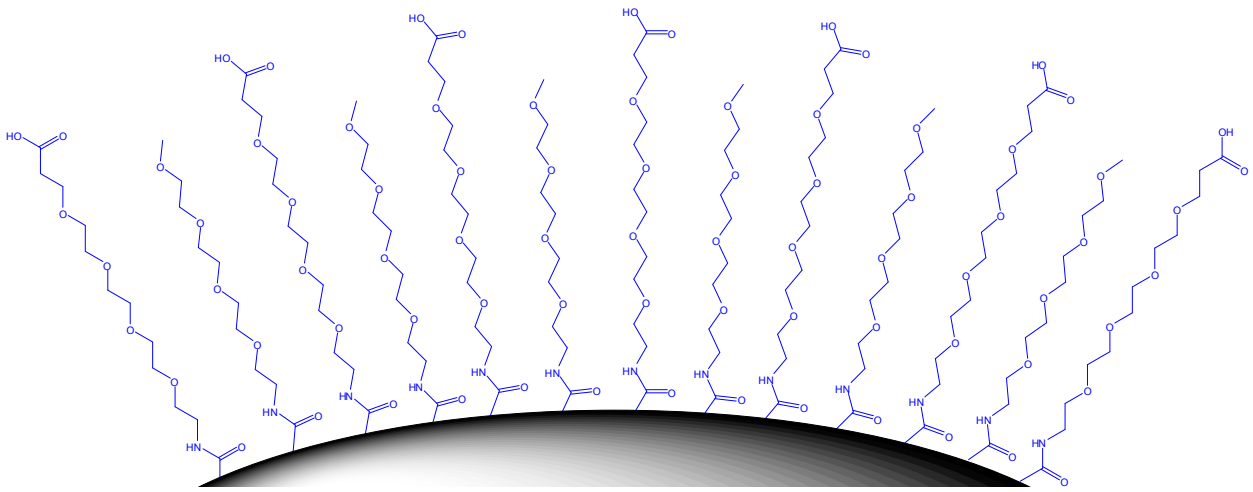
3.4.4 mPEG-Amines

Methoxy-PEG-amines react with carboxyl (acids/active esters) and carbonyl groups (aldehydes/ketones) to increase water solubility and decrease aggregation. They can be used for modification of surfaces to eliminate hydrophobic interactions and, in combination with amino-PEGacids, to cap with functionality. Furthermore, they are potentially very useful as drug modifiers to increase the hydrodynamic volume.

mPEG-Amines impart significant water solubility, non-immunogenicity and non-toxicity. They are soluble in all organic solvents from moderate to higher polarity (preferably DCM or DMAC). Activation of the corresponding acid can be done with EDC and NHS. This is best done in a non-amine containing buffer, e.g., in MES buffer at pH 5-6. Then raise the pH to 7.2 to 7.5 with phosphate buffer just before reacting with the amine or after the amine has been added.

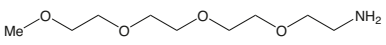
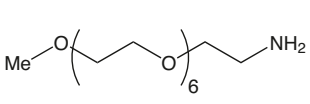
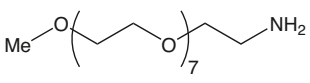
Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 215-233; ISBN 978-0-12-370501-3



General guidelines for use:

In all cases care should be taken in handling amines. They are very hygroscopic and will react with atmosphere over time adsorbing water and carbondioxide (CO_2). Approriated handling and storage under inert atmosphere is required. Up to PEG(12) they are liquids, longer derivatives are solids, when kept cold.

		Article No.	Quantity	Price
PEG1685 **MeO-dPEG(4)-NH_2**		PEG1685.0100	100 mg	€ 200,00
		PEG1685.0001	1 g	€ 425,00
2,5,8,11-Tetraoxatridecan-13-amine CAS-NO: 85030-56-4 FORMULA: $C_9H_{21}NO_4$ MOLECULAR WEIGHT: 207,27 g/mole FURTHER INFORMATION: Spacer length 14 atoms or 15.5 A				
PEG1730 **MeO-PEG(7)-NH_2**		PEG1730.0001	1 g	€ 285,00
2,5,8,11,14,17,20-heptaoxadocosan-22-amine FORMULA: $C_{15}H_{33}NO_7$ MOLECULAR WEIGHT: 339,43 g/mole				
PEG1700 **MeO-dPEG(8)-NH_2**		PEG1700.0100	100 mg	€ 235,00
		PEG1700.0001	1 g	€ 550,00
2,5,8,11,14,17,20,23-Octaoxapentacosan-25-amine CAS-NO: 869718-81-0 FORMULA: $C_{17}H_{37}NO_8$ MOLECULAR WEIGHT: 383,48 g/mole FURTHER INFORMATION: Spacer length 26 atoms or 29.7 A				

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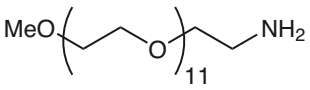
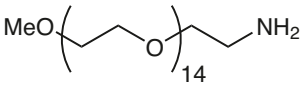
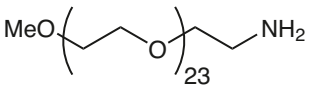
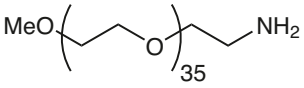
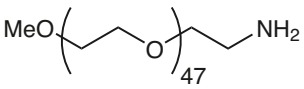
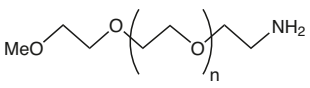
		Article No.	Quantity	Price
PEG1655 **MeO-dPEG(12)-NH_2**		PEG1655.0100	100 mg	€ 265,00
2,5,8,11,14,17,20,23,26,29,32,35-Dodecaoxaheptatriacontan-37-amine CAS-NO: 32130-27-1 FORMULA: $C_{25}H_{53}NO_{12}$ MOLECULAR WEIGHT: 559,69 g/mole FURTHER INFORMATION: Spacer length 38 atoms or 43.9 A		PEG1655.0001	1 g	€ 775,00
PEG3290 **MeO-dPEG™(15)-NH_2**		PEG3290.0100	100 mg	€ 295,00
alpha-Methoxy-omega-amino-15(ethylene glycol) CAS-NO: 32130-27-1 FORMULA: $C_{31}H_{65}NO_{15}$ MOLECULAR WEIGHT: 691,85 g/mole FURTHER INFORMATION: Spacer length 47 atoms or 53.4 A		PEG3290.1000	1 g	€ 850,00
PEG1670 **MeO-dPEG(24)-NH_2**		PEG1670.0100	100 mg	€ 325,00
alpha-Methoxy-omega-amino-24(ethylene glycol) CAS-NO: 32130-27-1 FORMULA: $C_{49}H_{101}NO_{24}$ MOLECULAR WEIGHT: 1088,34 g/mole FURTHER INFORMATION: Spacer length 74 atoms or 86.1 A		PEG1670.0001	1 g	€ 1150,00
PEG3300 **MeO-dPEG™(36)-NH_2**		PEG3300.0100	100 mg	€ 385,00
alpha-Methoxy-omega-amino-36(ethylene glycol) CAS-NO: 32130-27-1 FORMULA: $C_{73}H_{149}NO_{36}$ MOLECULAR WEIGHT: 1616,95 g/mole FURTHER INFORMATION: Spacer length 109 atoms or 130.1 A		PEG3300.1000	1 g	€ 1250,00
PEG3310 **MeO-dPEG™(48)-NH_2**		PEG3310.0100	100 mg	€ 455,00
alpha-Methoxy-omega-amino-48(ethylene glycol) CAS-NO: 32130-27-1 FORMULA: $C_{97}H_{197}NO_{48}$ MOLECULAR WEIGHT: 2145,58 g/mole FURTHER INFORMATION: Spacer length 146 atoms or 174.0 A		PEG3310.1000	1 g	€ 1400,00
PEG1155 **MeO-PEG-NH_2**		PEG1155.0001	1 g	€ 90,00
alpha-Methoxy-omega-amino poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 Da		PEG1155.0005	5 g	€ 350,00
PEG1152 **MeO-PEG-NH_2**		PEG1152.0001	1 g	€ 75,00
alpha-Methoxy-omega-amino poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1152.0005	5 g	€ 275,00
PEG1154 **MeO-PEG-NH_2**		PEG1154.0001	1 g	€ 75,00
alpha-Methoxy-omega-amino poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1154.0005	5 g	€ 275,00
PEG1151 **MeO-PEG-NH_2**		PEG1151.0001	1 g	€ 90,00
alpha-Methoxy-omega-amino poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1151.0005	5 g	€ 350,00
PEG1153 **MeO-PEG-NH_2**		PEG1153.0001	1 g	€ 90,00
alpha-Methoxy-omega-amino poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1153.0005	5 g	€ 350,00

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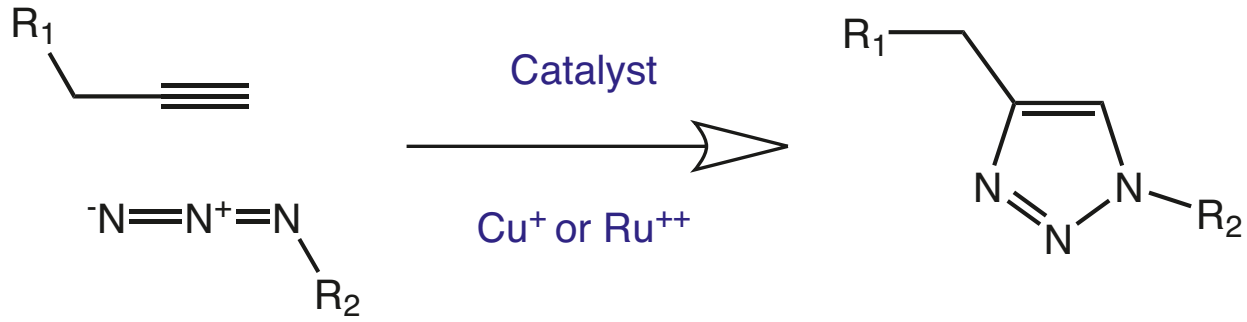
3.5 PEG-Alkynes & Azides for Click-Chemistry

The Click Reaction



Azido and alkyne functions can cyclise by an intramolecular CuI or Cu0 catalyzed azide-alkyne 1,3-dipolar cycloaddition (CuAAC). This so-called Click Reaction, developed by K. Barry Sharpless and Morton Meldal, has meanwhile grown to a widely used type of reaction orthogonal to many other types of reactions in different kinds of applications. Both residues R_1 and R_2 can be used either as conjugation partners or as substrates. Due to its high thermodynamic driving force, usually greater than 20 kcal/mol, the click reaction normally proceeds rapidly to completion and also tends to be highly selective for a single product.

A variety of azido and alkyne building blocks is available, where some can be incorporated into biomolecules by recombinant syntheses, in particular by non natural protein translation using the amber-suppression-based orthogonal system or by chemical reactions, for example by solid phase synthesis. Then the conjugation with a second molecule carrying the appropriate other function can be done.

Tris(benzyltriazolylmethyl)amine (TBTA; RL-2010) is stabilizing copper(I) towards oxidation in solution by forming a complex and catalyzes effectively quantitative, regioselective Huisgen 1,3-dipolar cycloadditions between alkynes and azides (the so called ‚click' cycloaddition reaction), in a variety of aqueous and organic solvents. In literature it has been gaining widespread use as a biochemical tool for the tagging of proteins and enzymes.

References:

- A stepwise Huisegen cycloaddition process: copper (I)-catalyzed regioselective ligation of azides and terminal alkynes; Vsevolod V. Rostovtsev, Luke G. Green and K. Barry Sharpless; *Angew. Chem. Int. Ed.* 2002; **41**: 2596-2599.
- Peptidotriazoles on solid phase: [1,2,3]-triazoles by regiospecific copper(I)-catalyzed 1,3-dipolar cycloaddition of terminal alkynes to azides; Christian W. Tornøe, Caspar Christensen; Morten Meldal; *J.Org.Chem.* 2002; **67**: 3057-3064.
- Click Chemistry: Diverse Chemical Function from a Few Good Reactions; Hartmuth C. Kolb, M. G. Finn, and K. Barry Sharpless, *Angew. Chem., Int. Eng. Ed.* 2001; **40**: 2004-2021.
- The growing impact of click chemistry on drug discovery; Hartmuth C. Kolb and K. Barry Sharpless; *Drug Discovery Today* 2003; **8(24)**: 1128-1131.
- Cu-I-Catalyzed Alkyne-Azide „Click" Cycloadditions from a Mechanistic and Synthetic Perspective; Victoria C. Bock, Henk Hiemstra and Jan H. van Maarseveen; *Eur. J. Org. Chem.* 2006; **1**: 51-68.
- A3-Type Star Polymer via Click Chemistry; O. Altintas, B. Yankul, G. Hizal and U. Tunca; *J. Poly. Sci.: Part A, Polymer Chem.* 2006; **44**: 6458-6465.
- Preparation of alumina supported copper nanoparticles and their application in the synthesis of 1,2,3- triazoles; M. Lakshmi Kantam et al.; *J. Mol. Catal. A: Chem.* 2006; **256**: 273-277.
- A Rapid and Versatile Method to Label Receptor Ligand Using „Click" Chemistry: Validation with the Muscarinic M1 Antagonist Pirenzepine; Dominique Bonnet et al.; *Bioconjugate Chemistry* 2006; **17**: 1618-1623.
- Alkyne-azide click reaction catalyzed by metallic copper under ultrasound; Pedro Cintas et al.; *Nature Protocols* 2010; **5(3)**: 607-616.
- Synthesis of a DOTA-Biotin Conjugate for Radionuclide Chelation via Cu-Free Click Chemistry; Michael K. Schultz, Sharavathi G. Parameswarappa, and F. Christopher Pigge; *Org. Lett.* 2010; **12(10)**: 2398-2401.
- Polytriazoles as Copper(I)-Stabilizing Ligands in Catalysis; Timothy R. Chan, Robert Hilgraf, K. Barry Sharpless, and Valery V. Fokin; *Org. Lett.* 2004; **6(17)**: 2853–2855. doi:10.1021/ol0493094.
- "Click" Cycloaddition Catalysts: Copper(I) and Copper(II) Tris(triazolylmethyl)amine Complexes; Paul S. Donnely et al.; *Chem. Commun.* 2008; **(21)**: 2459–2461. doi:10.1039/b719724a

Catalyst-free Click Reaction

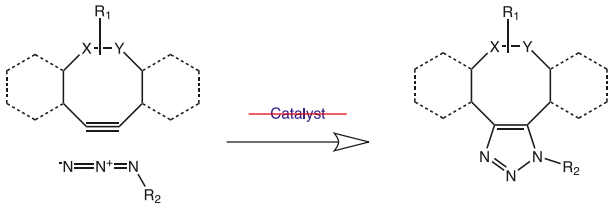
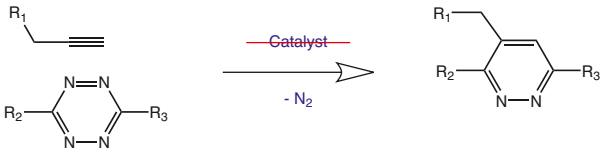
Cycloaddition reactions such as the [3+2] azide-alkyne and the [4+2] Diels-Alder reaction are becoming common conjugation techniques. Applications range from imaging, drug design and development of sensors, thereby spanning the fields of chemical biology, material science, surface and polymer chemistry as well as many other fields.

Introduced in 2002, the copper-catalyzed variant of the azide-alkyne cycloaddition (CuAAC) reaction has found broad applicability in the aforementioned field and as such is currently the most widely used conjugation technique. The presence of copper, however, limits the in vivo application of this reaction for several reasons:

- High cell toxicity.
- Undesired oxidation of proteins.
- Inhibition of luminescence properties of nanocrystals.

To allow fast and efficient in vivo conjugation, new methodologies have emerged that do not require the use of a metal catalysts, while still making use of the bioorthogonal functional groups, i.e. azides and alkynes. The most commonly used approaches can be classified into two categories:

- Strained cyclooctyne systems that react rapidly with azides.
- Substituted 1,2,4,5-tetrazines for fast reactions with (un)strained alkenes/alkynes.

Strained Cyclooctynes	Substituted 1,2,4,5-tetrazines
	

Review articles on copper-free cycloaddition reactions:

- Bioorthogonal labelling of biomolecules: new functional handles and ligation methods; Marjoke F. Debets, Jan C. M. van Hest and Floris P. J. T. Rutjes; *Org. Biomol. Chem.* 2013; **11:** 6439-6455; DOI: 10.1039/c3ob41329b.
- Bioconjugation with Strained Alkenes and Alkynes; Marjoke F. Debets, Sander S. van Berkel, Jan Dommerholt, A. (Ton) J. Dirks, Floris P. J. T. Rutjes, and Floris L. van Delft; *Accounts of Chemical Research* 2011; **44(9):** 805-815. DOI: 10.1021/ar200059z.
- Azide: A Unique Dipole for Metal-Free Bioorthogonal Ligations; Marjoke F. Debets, Christianus W. J. van der Doelen, Floris P. J. T. Rutjes, and Floris L. van Delft; *ChemBioChem* 2010; **11:** 1168 – 1184. DOI: 10.1002/cbic.201000064.
- Bioorthogonal Chemistry: Fishing for Selectivity in a Sea of Functionality; Ellen M. Sletten, Carolyn R. Bertozzi; *Angew. Chem. Int. Ed.* 2009; **48(38):** 6974-6998. doi: 10.1002/anie.200900942.
- Bioorthogonal chemistry: strategies and recent developments. Ramil CP, Lin Q.; *Chem Commun (Camb).* 2013; **49(94):** 11007-22. doi: 10.1039/c3cc44272a.
- Biomedical Applications of Tetrazine Cycloadditions; Neal K. Devaraj and Ralph Weissleder; *Acc. Chem. Res.* 2011; **44(9):** 816-827. DOI: 10.1021/ar200037t.

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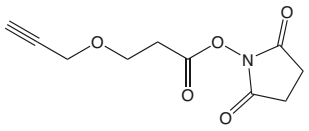
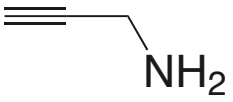
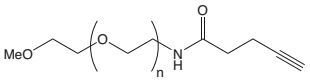
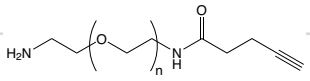
3.5.1 PEG-Alkynes

		Article No.	Quantity	Price
PEG1935 Propargyl-NHS 3-(Prop-2-ynyloxy)propanoic acid succinimidyl ester CAS-NO: 1174157-65-3 FORMULA: $C_{10}H_{11}NO_5$ MOLECULAR WEIGHT: 225,2 g/mole FURTHER INFORMATION: Spacer length 7 atoms or 7.2 A		PEG1935.0100 PEG1935.0001	100 mg 1 g	€ 175,00 € 525,00
PEG2755 Propargyl amine CAS-NO: 2450-71-7 FORMULA: C_3H_5N MOLECULAR WEIGHT: 55,08 g/mole FURTHER INFORMATION: Spacer length 4 atoms or 3.5 A		PEG2755.0005 PEG2755.0025	5 g 25 g	€ 175,00 € 350,00
PEG2840 MeO-PEG-alkyne alpha-Methoxy-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 Da		PEG2840.0500 PEG2840.0001	500 mg 1 g	€ 230,00 € 400,00
PEG2810 MeO-PEG-alkyne alpha-Methoxy-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 2000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG2810.0500 PEG2810.0001	500 mg 1 g	€ 110,00 € 200,00
PEG2830 MeO-PEG-alkyne alpha-Methoxy-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 5000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG2830.0500 PEG2830.0001	500 mg 1 g	€ 110,00 € 200,00
PEG2800 MeO-PEG-alkyne alpha-Methoxy-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 10000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG2800.0500 PEG2800.0001	500 mg 1 g	€ 140,00 € 225,00
PEG2820 MeO-PEG-alkyne alpha-Methoxy-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 20000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG2820.0500 PEG2820.0001	500 mg 1 g	€ 140,00 € 225,00
PEG2960 H_2N-PEG-alkyne alpha-Amino-omega-propargylacetamido poly(ethylene glycol) MOLECULAR WEIGHT: 3000 Da		PEG2960.0500 PEG2960.0001	500 mg 1 g	€ 370,00 € 610,00
PEG2980 H_2N-PEG-alkyne alpha-Amino-omega-propargylacetamido poly(ethylene glycol) MOLECULAR WEIGHT: 5000 Da		PEG2980.0500 PEG2980.0001	500 mg 1 g	€ 370,00 € 610,00
PEG2950 H_2N-PEG-alkyne alpha-Amino-omega-propargylacetamido poly(ethylene glycol) MOLECULAR WEIGHT: 10000 Da		PEG2950.0500 PEG2950.0001	500 mg 1 g	€ 400,00 € 675,00
PEG2970 H_2N-PEG-alkyne alpha-Amino-omega-propargylacetamido poly(ethylene glycol) MOLECULAR WEIGHT: 20000 Da		PEG2970.0500 PEG2970.0001	500 mg 1 g	€ 400,00 € 675,00

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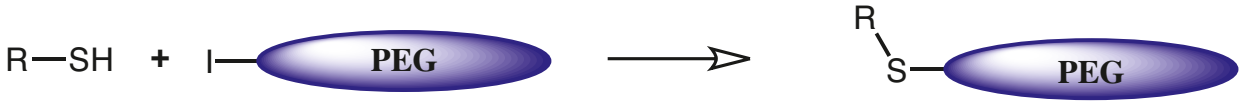
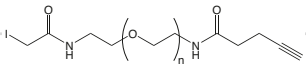
In conjugation techniques with thiol groups from Cystein or other SH carrying moieties normally maleimides are used. They react also with other acid protons like for example from OH or NH_2 and give appropriate unwanted impurities. The Iodo group reacts much more specifically with thiol resulting in much cleaner conjugates.

References:

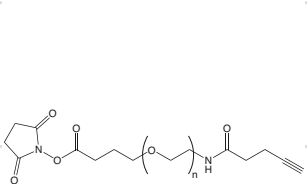
- Quantitative reactivity profiling predicts functional cysteines in proteomes; E. Weerapana, C. Wang, G. M. Simon, F. Richter, S. Khare, M. B. D. Dillon, D. A. Bachovchin, K. Mowen, D. Baker and B. F. Cravatt; *Nature* 2010; **468**: 790-795. doi:10.1038/nature09472



		Article No.	Quantity		Price
PEG3110	**I-PEG-alkyne**	PEG3110.0100	100 mg	€	225,00
alpha-Iodo-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 3000 Dalton)		PEG3110.0500	500 mg	€	625,00
MOLECULAR WEIGHT: 3000 Da					
PEG3120	**I-PEG-alkyne**	PEG3120.0100	100 mg	€	225,00
alpha-Iodo-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 5000 Dalton)		PEG3120.0500	500 mg	€	625,00
MOLECULAR WEIGHT: 5000 Da					
PEG3090	**I-PEG-alkyne**	PEG3090.0100	100 mg	€	250,00
alpha-Iodo-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 10000 Dalton)		PEG3090.0500	500 mg	€	675,00
MOLECULAR WEIGHT: 10000 Da					
PEG3100	**I-PEG-alkyne**	PEG3100.0100	100 mg	€	250,00
alpha-Iodo-omega-propargylacetamido poly(ethylene glycol) (PEG-MW 20000 Dalton)		PEG3100.0500	500 mg	€	675,00
MOLECULAR WEIGHT: 20000 Da					



PEG2860	**NHS-PEG-alkyne**	PEG2860.0500	500 mg	€	475,00
alpha-Succinimidyl ester-omega-propargylacetamido poly(ethylene glycol)		PEG2860.0001	1 g	€	825,00
MOLECULAR WEIGHT: 3000 Da					
PEG2880	**NHS-PEG-alkyne**	PEG2880.0500	500 mg	€	475,00
alpha-Succinimidyl ester-omega-propargylacetamido poly(ethylene glycol)		PEG2880.0001	1 g	€	825,00
MOLECULAR WEIGHT: 5000 Da					
PEG2850	**NHS-PEG-alkyne**	PEG2850.0500	500 mg	€	500,00
alpha-Succinimidyl ester-omega-propargylacetamido poly(ethylene glycol)		PEG2850.0001	1 g	€	880,00
MOLECULAR WEIGHT: 10000 Da					
PEG2870	**NHS-PEG-alkyne**	PEG2870.0500	500 mg	€	500,00
alpha-Succinimidyl ester-omega-propargylacetamido poly(ethylene glycol)		PEG2870.0001	1 g	€	880,00
MOLECULAR WEIGHT: 20000 Da					



PEG4950	**Biotin-PEG(4)-alkyne**	PEG4950.0250	250 mg	€	200,00
15-[D(+)-Biotinylamino]-4,7,10,13-tetraoxapentadec-1-yne		PEG4950.0001	1 g	€	650,00
FORMULA: $C_{21}H_{35}N_3O_6S$					
MOLECULAR WEIGHT: 457,58 g/mole					
FURTHER INFORMATION: Purity > 95% (HPLC)					

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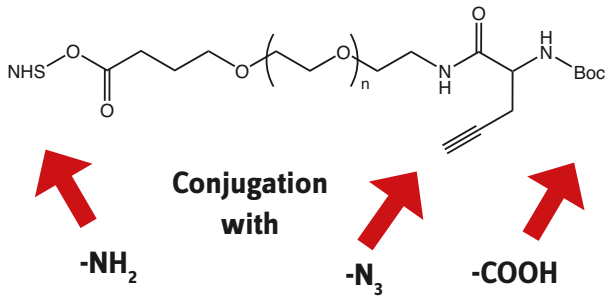
Tri-functional PEG Cross-Linker

Tri-functional PEG, carrying three orthogonal reactive groups:

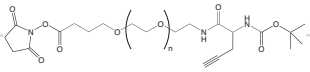
1. The **NHS** group can react with nucleophiles like amines or alcohols.
2. At the **Boc-Amino** position the free amino group (after removal of the Boc protecting group) can form a stable amide bond with activated esters.
3. Finally the **Alkyne** function is still free for the Click reaction with the third partner.

Two interacting partners - like protein and receptor – can be conjugated in this way, and the interaction monitored by attaching a dye, fluorophore, NMR or spin label for highly sophisticated experiments.



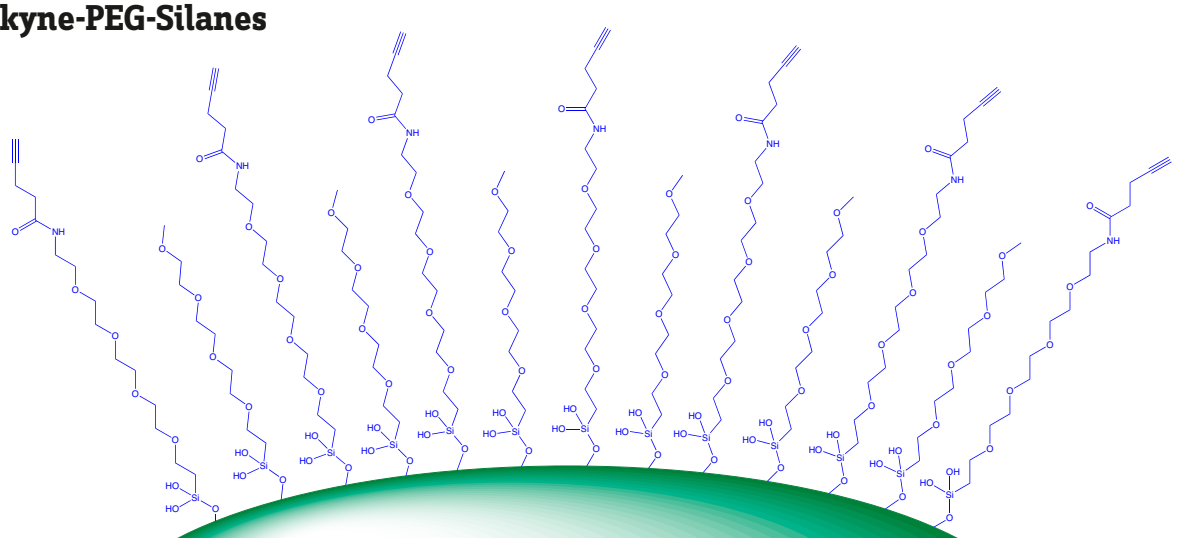
NHS-PEG(NH-Boc)-alkyne

α-succinimidyl ester-ω-(N-t-butyloxycarbonyl-L-propargyl-glycinyl) poly(ethylene glycol)



		Article No.	Quantity	Price
PEG2910	**NHS-PEG(NH-Boc)-alkyne** alpha-Succinimidyl ester-omega-(N-t-Butyloxycarbonyl-L-propargyl-glycinyl) poly(ethylene glycol) MOLECULAR WEIGHT: 3000 Da	PEG2910.0500	500 mg	€ 500,00
		PEG2910.0001	1 g	€ 880,00
PEG2930	**NHS-PEG(NH-Boc)-alkyne** alpha-Succinimidyl ester-omega-(N-t-Butyloxycarbonyl-L-propargyl-glycinyl) poly(ethylene glycol) MOLECULAR WEIGHT: 5000 Da	PEG2930.0500	500 mg	€ 500,00
		PEG2930.0001	1 g	€ 880,00
PEG2900	**NHS-PEG(NH-Boc)-alkyne** alpha-Succinimidyl ester-omega-(N-t-Butyloxycarbonyl-L-propargyl-glycinyl) poly(ethylene glycol) MOLECULAR WEIGHT: 10000 Da	PEG2900.0500	500 mg	€ 550,00
		PEG2900.0001	1 g	€ 960,00
PEG2920	**NHS-PEG(NH-Boc)-alkyne** alpha-Succinimidyl ester-omega-(N-t-Butyloxycarbonyl-L-propargyl-glycinyl) poly(ethylene glycol) MOLECULAR WEIGHT: 20000 Da	PEG2920.0500	500 mg	€ 550,00
		PEG2920.0001	1 g	€ 960,00

Alkyne-PEG-Silanes



*The broad variety of the Click reaction can be applied on surfaces using appropriate **PEG-silanes**, where silicate particles can be coated with.*

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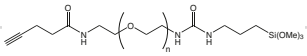
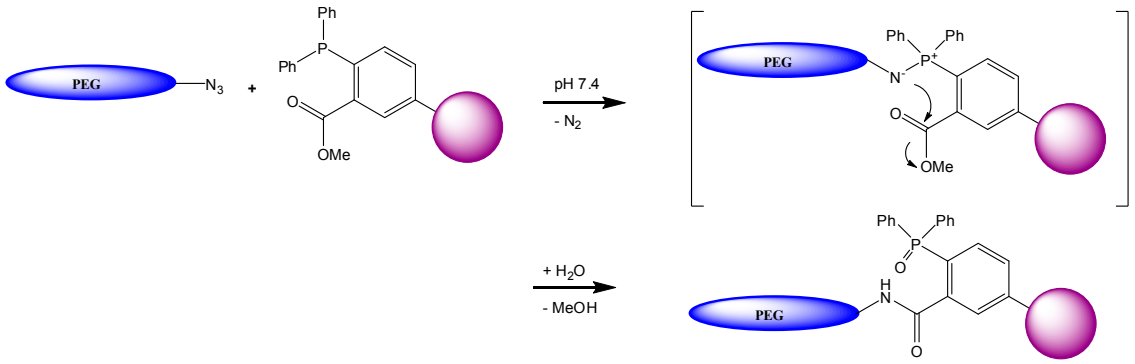
		Article No.	Quantity	Price
PEG4810 **Alkyne-PEG-Si(OMe)$_3$** alpha-Propargylacetamido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG4810.0500	500 mg	€ 500,00
		PEG4810.1000	1 g	€ 900,00
PEG4815 **Alkyne-PEG-Si(OMe)$_3$** alpha-Propargylacetamido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG4815.0500	500 mg	€ 500,00
		PEG4815.1000	1 g	€ 900,00
PEG4820 **Alkyne-PEG-Si(OMe)$_3$** alpha-Propargylacetamido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG4820.0500	500 mg	€ 500,00
		PEG4820.1000	1 g	€ 900,00
PEG4825 **Alkyne-PEG-Si(OMe)$_3$** alpha-Propargylacetamido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG4825.0500	500 mg	€ 500,00
		PEG4825.1000	1 g	€ 900,00

3.5.2 PEG-Azides

The azide can potentially be reacted with an acetylene moiety (Click reaction) or an arylphosphinederivative, as part of several Staudinger ligation options (see references). It can also be used as a precursor to the amine function in which it can be transformed via reduction with P(Ph)$_3$.

The tremendous attraction to the azide functionality is its very low reactivity and high stability under most conditions. However, under very specific conditions, the azide is very reactive and highly selective.

The Staudinger Ligation



References:

- The Staudinger Ligation–A Gift to Chemical Biology; M. Köhn and R. Breinbauer; *Angew Chem. Int. Ed.* 2004; **43**: 3106-3116. doi:10.1002/anie.200401744
- Traceless Staudinger Ligation of Glycosyl Azides with Triaryl Phosphines: Stereoselective Synthesis of Glycosyl Amides†; A. Bianchi and A. Bernardi; *J Org Chem* 2006; **71**: 4565-4577. doi:10.1021/jo060409s
- Reaction Mechanism and Kinetics of the Traceless Staudinger Ligation; M. B. Soellner, B. L. Nilsson and R. T. Raines; *J Am Chem Soc* 2006; **128**: 8820-8828. doi:10.1021/ja060484k
- Cell Surface Engineering by a Modified Staudinger Reaction; E. Saxon and C. R. Bertozzi; *Science* 2000; **287**: 2007-2010. doi:10.1126/science.287.5460.2007
- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 722-726; ISBN 978-0-12-370501-3
- A "Traceless" Staudinger Ligation for the Chemoselective Synthesis of Amide Bonds; E. Saxon, J. I. Armstrong and C. R. Bertozzi; *Org Lett* 2000; **2**: 2141-2143. doi:10.1021/ol006054v
- Staudinger Ligation: A Peptide from a Thioester and Azide; B. L. Nilsson, L. L. Kiessling and R. T. Raines; *Org Lett* 2000; **2**: 1939-1941. doi:10.1021/ol0060174
- Chemoselective Staudinger-Phosphite Reaction of Azides for the Phosphorylation of Proteins; R. Serwa, I. Wilkening, G. Del Signore, M. Mühlberg, I. Claußnitzer, C. Weise, M. Gerrits and C. P. R. Hackenberger; *Angew Chem. Int. Ed.* 2009; **48**: 8234-8239. doi:10.1002/anie.200902118
- Chemoselective Peptide Cyclization by Traceless Staudinger Ligation; R. Kleineweischede and C. P. R. Hackenberger; *Angew Chem. Int. Ed.* 2008; **47**: 5984-5988. doi:10.1002/anie.200801514

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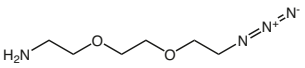
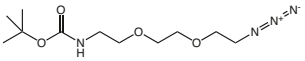
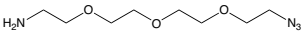
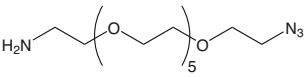
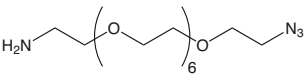
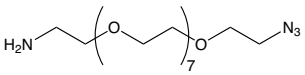
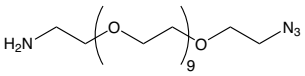
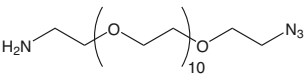
		Article No.	Quantity	Price
PEG4980 **H_2N-PEG(2)-N_3*TosOH** 2-[2-(2-Azidoethoxy)ethoxy]ethanaminium tosylat CAS-NO: 166388-57-4 net FORMULA: $C_6H_{14}N_4O_2*C_6H_8O_3S$ MOLECULAR WEIGHT: 174,20*172,20 g/mole		PEG4980.0001 PEG4980.0005 PEG4980.0025	1 g 5 g 25 g	€ 125,00 € 450,00 € 1800,00
PEG4960 **Boc-NH-PEG(2)-N_3** 1-(t-Butyloxycarbonyl-amino)-3,6-dioxa-8-octaneazide CAS-NO: 950683-55-3 FORMULA: $C_{11}H_{22}N_4O_4$ MOLECULAR WEIGHT: 274,32 g/mole		PEG4960.0001 PEG4960.0005 PEG4960.0025	1 g 5 g 25 g	€ 125,00 € 450,00 € 1800,00
PEG3060 **H_2N-PEG(3)-N_3** 1-Amino-11-azido-3,6,9-trioxaundecane CAS-NO: 134179-38-7 FORMULA: $C_8H_{18}N_4O_3$ MOLECULAR WEIGHT: 218,25 g/mole		PEG3060.0100 PEG3060.0001	100 mg 1 g	€ 175,00 € 325,00

References:

- Desymmetrization Reactions: Efficient Preparation of Unsymmetrically Substituted Linker Molecules; A. W. Schwabacher, J. W. Lane, M. W. Schiesher, K. M. Leigh and C. W. Johnson; *J Org Chem* 1998; **63**: 1727-1729. doi:10.1021/jo971802o
- The synthesis of heterobifunctional linkers for the conjugation of ligands to molecular probes; C. R. Bertozzi and M. D. Bednarski; *J Org Chem* 1991; **56**: 4326-4329. doi:10.1021/jo00013a053

		Article No.	Quantity	Price
PEG1087 **H_2N-PEG(6)-N_3** alpha-Amino-omega-azido hexa(ethylene glycol) CAS-NO: 957486-82-7 FORMULA: $C_{14}H_{30}N_4O_6$ MOLECULAR WEIGHT: 350,42 g/mole		PEG1087.0001 PEG1087.0005 PEG1087.0025	1 g 5 g 25 g	€ 275,00 € 975,00 € 3500,00
PEG2350 **H_2N-PEG(7)-N_3** alpha-Amino-omega-azido hepta(ethylene glycol) CAS-NO: 1333154-77-0 FORMULA: $C_{16}H_{34}N_4O_7$ MOLECULAR WEIGHT: 394,46 g/mole FURTHER INFORMATION: Spacer length 25 atoms or 28.8 A		PEG2350.0100 PEG2350.0001	100 mg 1 g	€ 265,00 € 550,00
PEG3050 **H_2N-PEG(9)-N_3** alpha-Amino-omega-azido nona(ethylene glycol) FORMULA: $C_{18}H_{38}N_4O_8$ MOLECULAR WEIGHT: 438,52 g/mole		PEG3050.0001 PEG3050.0005	1 g 5 g	€ 275,00 € 975,00
PEG3040 **H_2N-PEG(10)-N_3** alpha-Amino-omega-azido deca(ethylene glycol) FORMULA: $C_{22}H_{46}N_4O_{10}$ MOLECULAR WEIGHT: 526,62 g/mole		PEG3040.0001 PEG3040.0005	1 g 5 g	€ 325,00 € 1100,00
PEG1081 **H_2N-PEG(11)-N_3** alpha-Amino-omega-azido undecae(ethylene glycol) CAS-NO: 749244-38-0 FORMULA: $C_{24}H_{50}N_4O_{11}$ MOLECULAR WEIGHT: 570,69 g/mole FURTHER INFORMATION: Spacer length 36 atoms or 44.2 A		PEG1081.0001 PEG1081.0005 PEG1081.0025	1 g 5 g 25 g	€ 350,00 € 1200,00 € 4250,00

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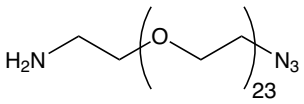
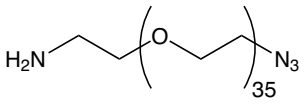
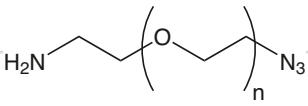
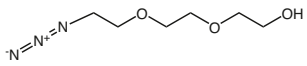
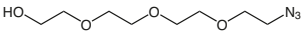
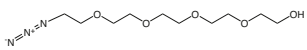
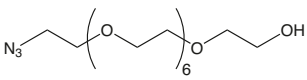
		Article No.	Quantity	Price
PEG3070 H_2N-PEG(23)-N_3		PEG3070.0100	100 mg	€ 385,00
alpha-Azido-omega-amino 23(ethylene glycol) CAS-NO: 749244-38-0 FORMULA: $C_{48}H_{98}N_4O_{23}$ MOLECULAR WEIGHT: 1099,3 g/mole		PEG3070.0001	1 g	€ 1100,00
PEG3080 H_2N-PEG(35)-N_3		PEG3080.0100	100 mg	€ 455,00
alpha-Azido-omega-amino 35(ethylene glycol) CAS-NO: 749244-38-0 FORMULA: $C_{72}H_{146}N_4O_{35}$ MOLECULAR WEIGHT: 1627,94 g/mole		PEG3080.0001	1 g	€ 1550,00
PEG3010 H_2N-PEG-N_3		PEG3010.0500	500 mg	€ 370,00
alpha-Amino-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 3000 Da		PEG3010.0001	1 g	€ 610,00
PEG3030 H_2N-PEG-N_3		PEG3030.0500	500 mg	€ 370,00
alpha-Amino-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 5000 Da		PEG3030.0001	1 g	€ 610,00
PEG3000 H_2N-PEG-N_3		PEG3000.0500	500 mg	€ 400,00
alpha-Amino-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 10000 Da		PEG3000.0001	1 g	€ 675,00
PEG3020 H_2N-PEG-N_3		PEG3020.0500	500 mg	€ 400,00
alpha-Amino-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 20000 Da		PEG3020.0001	1 g	€ 675,00

		Article No.	Quantity	Price
PEG4900 N_3-EEEt-OH		PEG4900.0001	1 g	€ 125,00
2-[2-(2-Azidoethoxy)ethoxy]ethanol CAS-NO: 86520-52-7 FORMULA: $C_6H_{13}N_3O_3$ MOLECULAR WEIGHT: 175,19 g/mole		PEG4900.0005	5 g	€ 350,00
		PEG4900.0025	25 g	€ 1400,00
PEG3760 N_3-PEG(4)-OH		PEG3760.1000	1 g	€ 160,00
alpha-Azido-omega-hydroxy tetra(ethylene glycol) CAS-NO: 86770-67-4 FORMULA: $C_8H_{17}N_3O_4$ MOLECULAR WEIGHT: 219,24 g/mole FURTHER INFORMATION: Spacer length 14 atoms or 15.3 A		PEG3760.5000	5 g	€ 450,00
		PEG3760.9025	25 g	€ 1800,00
PEG5300 Azido-pentaethyleneglycol		PEG5300.0001	1 g	€ 190,00
2-(2-(2-(2-(2-Azidoethoxy)ethoxy)ethoxy)ethoxy)ethanol CAS-NO: 86770-68-5 FORMULA: $C_{10}H_{21}N_3O_5$ MOLECULAR WEIGHT: 263,29 g/mole		PEG5300.0005	5 g	€ 700,00
		PEG5300.0025	25 g	€ 2800,00
PEG1088 N_3-PEG(8)-OH		PEG1088.0001	1 g	€ 300,00
alpha-Azido-omega-hydroxy octa(ethylene glycol) CAS-NO: 352439-36-2 FORMULA: $C_{16}H_{33}N_3O_8$ MOLECULAR WEIGHT: 395,45 g/mole FURTHER INFORMATION: Spacer length 24 atoms or 29.5 A		PEG1088.0005	5 g	€ 900,00

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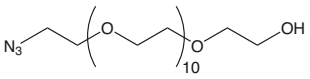
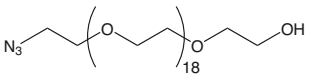
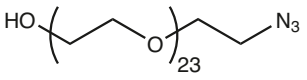
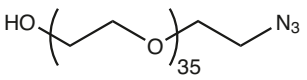
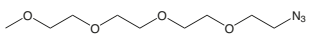
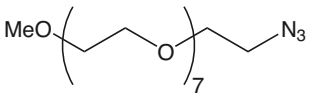
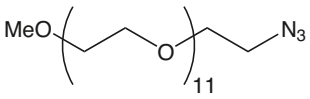
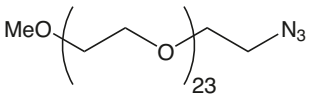
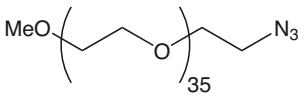
		Article No.	Quantity	Price
PEG1390 **N_3-dPEG(12)-OH**		PEG1390.0100	100 mg	€ 295,00
35-Azido-3,6,9,12,15,18,21,24,27,30,33-undecaoxapentatriacontan-1-ol CAS-NO: 73342-16-2 FORMULA: $C_{24}H_{49}N_3O_{12}$ MOLECULAR WEIGHT: 571,66 g/mole FURTHER INFORMATION: Spacer length 37 atoms or 43.0 A		PEG1390.0001	1 g	€ 675,00
PEG1220 **N_3-PEG(20)-OH**		PEG1220.0001	1 g	€ 325,00
alpha-Azido-omega-hydroxy icosa(ethylene glycol) FORMULA: $C_{40}H_{81}N_3O_{20}$ MOLECULAR WEIGHT: 924,1 g/mole		PEG1220.0005	5 g	€ 975,00
PEG3770 **N_3-dPEG™(24)-OH**		PEG3770.0100	100 mg	€ 420,00
alpha-Azido-omega-hydroxy 24(ethylene glycol) CAS-NO: 73342-16-2 FORMULA: $C_{48}H_{97}N_3O_{24}$ MOLECULAR WEIGHT: 1100,29 g/mole FURTHER INFORMATION: Spacer length 72 atoms or 86.7 A		PEG3770.1000	1 g	€ 1050,00
PEG3780 **N_3-dPEG™(36)-OH**		PEG3780.0100	100 mg	€ 455,00
alpha-Azido-omega-hydroxy 36(ethylene glycol) CAS-NO: 73342-16-2 FORMULA: $C_{72}H_{145}N_3O_{36}$ MOLECULAR WEIGHT: 1628,92 g/mole FURTHER INFORMATION: Spacer length 108 atoms or 129.7 A		PEG3780.1000	1 g	€ 1200,00
PEG1690 **MeO-dPEG(4)-N_3**		PEG1690.0100	100 mg	€ 200,00
13-Azido-2,5,8,11-tetraoxa-tridecane CAS-NO: 606130-90-9 FORMULA: $C_9H_{19}N_3O_4$ MOLECULAR WEIGHT: 233,26 g/mole FURTHER INFORMATION: Spacer length 14 atoms or 15.5 A		PEG1690.0001	1 g	€ 550,00
PEG1705 **MeO-dPEG(8)-N_3**		PEG1705.0100	100 mg	€ 235,00
2,5,8,11,14,17,20,23-Octaoxapentacosan-25-amine CAS-NO: 869718-80-9 FORMULA: $C_{17}H_{35}N_3O_8$ MOLECULAR WEIGHT: 409,48 g/mole FURTHER INFORMATION: Spacer length 26 atoms or 29.7 A		PEG1705.0001	1 g	€ 675,00
PEG1660 **MeO-dPEG(12)-N_3**		PEG1660.0100	100 mg	€ 295,00
37-Azido-2,5,8,11,14,17,20,23,26,29,32,35-dodecaoxaheptatriacontane CAS-NO: 89485-61-0 FORMULA: $C_{25}H_{51}N_3O_{12}$ MOLECULAR WEIGHT: 585,69 g/mole FURTHER INFORMATION: Spacer length 38 atoms or 44.0 A		PEG1660.0001	1 g	€ 775,00
PEG1710 **MeO-dPEG(24)-N_3**		PEG1710.0100	100 mg	€ 355,00
alpha-Methoxy-omega-azido-24(ethylene glycol) CAS-NO: 89485-61-0 FORMULA: $C_{49}H_{99}N_3O_{24}$ MOLECULAR WEIGHT: 1114,34 g/mole FURTHER INFORMATION: Spacer length 74 atoms or 86.9 A		PEG1710.0001	1 g	€ 880,00
PEG3430 **MeO-dPEG™(36)-N_3**		PEG3430.0100	100 mg	€ 385,00
alpha-Methoxy-omega-azido-36(ethylene glycol) CAS-NO: 89485-61-0 FORMULA: $C_{73}H_{147}N_3O_{36}$ MOLECULAR WEIGHT: 1642,95 g/mole FURTHER INFORMATION: Spacer length 110 atoms or 131.2 A		PEG3430.1000	1 g	€ 1100,00

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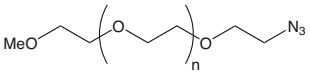
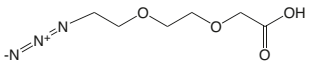
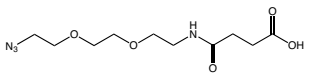
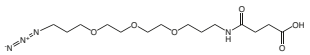
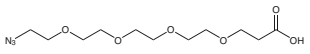
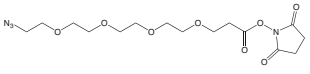
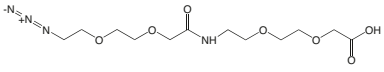
		Article No.	Quantity	Price
PEG1219 **MeO-PEG-N_3** alpha-Methoxy-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 750 Da		PEG1219.0500	500 mg	€ 230,00
		PEG1219.0001	1 g	€ 400,00
PEG1225 **MeO-PEG-N_3** alpha-Methoxy-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 2000 Da		PEG1225.0500	500 mg	€ 110,00
		PEG1225.0001	1 g	€ 200,00
PEG2040 **MeO-PEG-N_3** alpha-Methoxy-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 5000 Da		PEG2040.0500	500 mg	€ 110,00
		PEG2040.0001	1 g	€ 200,00
PEG2045 **MeO-PEG-N_3** alpha-Methoxy-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 10000 Da		PEG2045.0500	500 mg	€ 140,00
		PEG2045.0001	1 g	€ 225,00
PEG2050 **MeO-PEG-N_3** alpha-Methoxy-omega-azido poly(ethylene glycol) MOLECULAR WEIGHT: 20000 Da		PEG2050.0500	500 mg	€ 140,00
		PEG2050.0001	1 g	€ 225,00
PEG2780 **N_3-O2Oc-OH*CHA** [2-(2-azidoethoxy)ethoxy]acetic acid cyclohexylamine salt CAS-NO: 88518-90-3 net FORMULA: $C_6H_{11}N_3O_4$*$C_6H_{13}N$ MOLECULAR WEIGHT: 189.17*99.17 g/mole		PEG2780.0001	1 g	€ 150,00
		PEG2780.0005	5 g	€ 500,00
		PEG2780.0025	25 g	€ 2000,00
PEG5290 **N_3-DOOA-Suc-OH** 4-(2-(2-(2-azidoethoxy)ethoxy)ethylamino)-4-oxobutanoic acid FORMULA: $C_{10}H_{18}N_4O_5$ MOLECULAR WEIGHT: 274,27 g/mole		PEG5290.0001	1 g	€ 220,00
		PEG5290.0005	5 g	€ 750,00
		PEG5290.0025	25 g	€ 3000,00
PEG5170 **N_3-TOTA-Suc** 1-Azido-4,7,10-trioxa-13-tridecaneamine succinamic acid FORMULA: $C_{14}H_{26}N_4O_6$ MOLECULAR WEIGHT: 346,38 g/mole		PEG5170.0001	1 g	€ 190,00
		PEG5170.0005	5 g	€ 750,00
		PEG5170.0025	25 g	€ 3000,00
PEG2345 **N_3-PEG(4)-COOH** 15-Azido-4,7,10,13-tetraoxa-pentadecanoic acid CAS-NO: 1257063-35-6 FORMULA: $C_{11}H_{21}N_3O_6$ MOLECULAR WEIGHT: 291,3 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 17.7 A		PEG2345.0100	100 mg	€ 110,00
		PEG2345.0001	1 g	€ 370,00
		PEG2345.0005	5 g	€ 1400,00
PEG1400 **N_3-dPEG(4)-NHS** 15-Azido-4,7,10,13-tetraoxa-pentadecanoic acid succinimidyl ester CAS-NO: 944251-24-5 FORMULA: $C_{15}H_{24}N_4O_8$ MOLECULAR WEIGHT: 388,37 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 32.2 A		PEG1400.0100	100 mg	€ 235,00
		PEG1400.0001	1 g	€ 650,00
PEG2790 **N_3-O2Oc-O2Oc-OH** 8-(8-Azido-3,6-dioxaoctanoylamido)-3,6-dioxaoctanoic acid FORMULA: $C_{12}H_{22}N_4O_7$ MOLECULAR WEIGHT: 334.33 g/mole		PEG2790.0001	1 g	€ 400,00
		PEG2790.0005	5 g	€ 1600,00

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	Article No.	Quantity	Price
PEG4170 N_3-dPEG™(8)-COOH	PEG4170.0100	100 mg	€ 295,00
alpha-Azido-omega-(propionic acid) octa(ethylene glycol) CAS-NO: 1214319-92-2 FORMULA: $C_{19}H_{37}N_3O_{10}$ MOLECULAR WEIGHT: 467,51 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A	PEG4170.1000	1 g	€ 975,00
PEG1405 N_3-dPEG(8)-NHS	PEG1405.0100	100 mg	€ 265,00
1-Azido-3,6,9,12,15,18,21,24-octaoxaheptacosan-27-oic acid succinimidyl ester CAS-NO: 1204834-00-3 FORMULA: $C_{23}H_{40}N_4O_{12}$ MOLECULAR WEIGHT: 564,58 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A	PEG1405.0001	1 g	€ 825,00
PEG2015 N_3-PEG(9)-COOH	PEG2015.0001	1 g	€ 400,00
14-azido-5-oxo-3,9,12-trioxa-6-azatetradecan-1-oic acid FORMULA: $C_{22}H_{42}N_4O_{12}$ MOLECULAR WEIGHT: 554,59 g/mole	PEG2015.0005	5 g	€ 1350,00
PEG4180 N_3-dPEG™(12)-COOH	PEG4180.0100	100 mg	€ 325,00
alpha-Azido-omega-(propionic acid) dodeca(ethylene glycol) CAS-NO: 1167575-20-3 FORMULA: $C_{27}H_{53}N_3O_{14}$ MOLECULAR WEIGHT: 643,72 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A	PEG4180.1000	1 g	€ 1100,00
PEG1395 N_3-dPEG(12)-NHS	PEG1395.0100	100 mg	€ 295,00
1-Azido-3,6,9,12,15,18,21,24,27,30,33,36-dodecaoxanonatriacontan-39-oic acid succinimidyl ester CAS-NO: 1108750-59-9 FORMULA: $C_{31}H_{56}N_4O_{16}$ MOLECULAR WEIGHT: 740,79 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.2 A	PEG1395.0001	1 g	€ 950,00
PEG4190 N_3-dPEG™(24)-COOH	PEG4190.0100	100 mg	€ 355,00
alpha-Azido-omega-(propionic acid) 24(ethylene glycol) CAS-NO: 1167575-20-3 FORMULA: $C_{51}H_{101}N_3O_{26}$ MOLECULAR WEIGHT: 1172,35 g/mole FURTHER INFORMATION: Spacer length 76 atoms or 90.4 A	PEG4190.1000	1 g	€ 1225,00
PEG4940 Biotin-PEG(3)-N_3	PEG4940.0250	250 mg	€ 200,00
11-[D(+)-Biotinylamino]-1-azido-3,6,9-trioxaundecane FORMULA: $C_{18}H_{32}N_6O_5S$ MOLECULAR WEIGHT: 444,55 g/mole FURTHER INFORMATION: Purity > 95% (HPLC)	PEG4940.0001	1 g	€ 650,00
PEG4330 Biotin-dPEG™(7)-N_3	PEG4330.0100	100 mg	€ 265,00
alpha-Biotin-omega-azido hepta(ethylene glycol) CAS-NO: 1334172-75-6 FORMULA: $C_{26}H_{48}N_6O_9S$ MOLECULAR WEIGHT: 620,76 g/mole FURTHER INFORMATION: Spacer length 27 atoms or 30.7 A	PEG4330.1000	1 g	€ 1550,00
PEG4340 Biotin-dPEG™(11)-N_3	PEG4340.0100	100 mg	€ 325,00
alpha-Biotin-omega-azido undeca(ethylene glycol) CAS-NO: 956494-20-5 FORMULA: $C_{34}H_{64}N_6O_{13}S$ MOLECULAR WEIGHT: 796,97 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 50.4 A	PEG4340.1000	1 g	€ 1600,00

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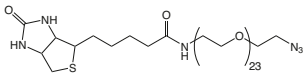
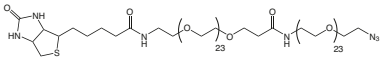
	Article No.	Quantity	Price
PEG4350 Biotin-dPEG™(23)-N_3	PEG4350.0100	100 mg	€ 385,00
	PEG4350.1000	1 g	€ 1850,00

alpha-Biotin-omega-azido 23(ethylene glycol)
CAS-NO: 956494-20-5
FORMULA: $C_{58}H_{112}N_6O_{25}S$
MOLECULAR WEIGHT: 1325,6 g/mole
FURTHER INFORMATION: Spacer length 73 atoms or 87.7 A



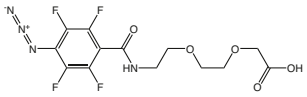
PEG4360 Biotin-dPEG™(47)-N_3 — please inquire!

alpha-Biotin-omega-azido 47(ethylene glycol)
FORMULA: $C_{109}H_{213}N_7O_{50}S$
MOLECULAR WEIGHT: 2453,94 g/mole
FURTHER INFORMATION: Spacer length 154 atoms or 186.5 A



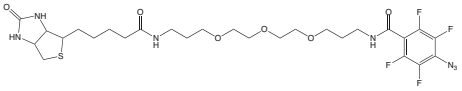
PEG5000 N_3-TFBA-O2Oc	PEG5000.0250	250 mg	€ 225,00
	PEG5000.1000	1 g	€ 500,00
	PEG5000.5000	5 g	€ 2000,00

{2-[2-(4-Azido-2,3,5,6-tetrafluorobenzoyl-amino)ethoxy]ethoxy}acetic acid
FORMULA: $C_{13}H_{12}F_4O_5$
MOLECULAR WEIGHT: 380,25 g/mole



PEG2065 Biotin-TEG-ATFBA	PEG2065.0025	25 mg	€ 200,00
	PEG2065.0100	100 mg	€ 355,00

Biotin-triethylenglycol-(p-azido-tetrafluorobenzamide)
CAS-NO: 1264662-85-2
FORMULA: $C_{27}H_{37}F_4N_7O_6S$
MOLECULAR WEIGHT: 663,68 g/mole
FURTHER INFORMATION: Spacer length 15 atoms or 16.9 A



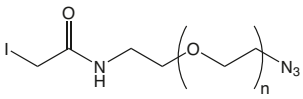
Aryl azides such as PEG5000 and PEG2065 are well-known precursors of nitrenes and have been introduced as **versatile photoaffinity labeling agents** to probe biological receptors. Upon photolysis, N_2 is liberated and a highly unstable singlet Phenylnitrene is being formed *in situ*, which **reacts non-specifically** with neighboring molecules such as C-H and N-H bonds in a variety of reactions. Perfluorophenyl azides, however, form highly stabilized nitrene intermediates that undergo insertion and addition reactions in moderate to good yields rather than intermolecular rearrangements. This type of compounds has been used as photo-cross linker (Lamda max = 258nm) in estrogen receptor studies and for direct surface coating of carbon and organic based polymers.

References:

- Affinity Labelling of Antibodies with Aryl Nitrene as Reactive Group; G. W. J. Fleet, R. R. Porter and J. R. Knowles; *Nature* 1969; **224**: 511-512. doi:10.1038/224511a0
- Chemistry and kinetics of singlet pentafluorophenylnitrene; R. Poe, K. Schnapp, M. J. T. Young, J. Grayzar and M. S. Platz; *J Am Chem Soc* 1992; **114**: 5054-5067. doi:10.1021/ja00039a016
- N-Hydroxysuccinimide Ester Functionalized Perfluorophenyl Azides as Novel Photoactive Heterobifunctional Crosslinking Reagents. The Covalent Immobilization of Biomolecules to Polymer Surfaces; M. Yan, S. X. Cai, M. N. Wybourne and J. F. W. Keana; *Bioconjug Chem* 1994; **5**: 151-157. doi:10.1021/bc00026a007
- High Efficiency Photolabeling of Human Serum Albumin and Human .gamma.-Globulin with [14C]Methyl 4-Azido-2,3,5,6-tetrafluorobenzoate; R. S. Pandurangi, S. R. Karra, R. R. Kuntz and W. A. Volkert; *Bioconjug Chem* 1995; **6**: 630-634. doi:10.1021/bc00035a019
- Synthesis and binding of new polyfluorinated aryl azides to alpha-chymotrypsin. New reagents for photoaffinity labeling; N. Soundararajan, S. H. Liu, S. Soundararajan and M. S. Platz; *Bioconjug Chem* 1993; **4**: 256-261. doi:10.1021/bc00022a002
- Comparison of Phenylcarbene and Phenylnitrene; M. S. Platz; *Accounts of chemical research* 1995; **28**: 487-492. doi:10.1021/ar00060a004
- Synthesis of a tetrafluoro-substituted aryl azide and its protio analog as photoaffinity labeling reagents for the estrogen receptor; K. G. Pinney and J. A. Katzenellenbogen; *J Org Chem* 1991; **56**: 3125-3133. doi:10.1021/jo00009a037
- Chemistry of Bifunctional Photoprobes: 4. Synthesis of the Chromogenic, Cleavable, Water Soluble, and Heterobifunctional Sulfosuccinimidyl (N-methylamino Perfluoroaryl Azido Benzamido)-ethyl-1,3′-Dithiopropionate: An Efficient Protein Cross-Linking Agent; R. S. Pandurangi, P. Lusiak, S. Desai and R. R. Kuntz; *Bioorg Chem* 1998; **26**: 201-212. doi:10.1006/bioo.1998.1098
- New reagents for photoaffinity labeling: synthesis and photolysis of functionalized perfluorophenyl azides; J. F. W. Keana and S. X. Cai; *J Org Chem* 1990; **55**: 3640-3647. doi:10.1021/jo00298a048
- Perfluorophenyl Azides: New Applications in Surface Functionalization and Nanomaterial Synthesis; L.-H. Liu and M. Yan; *Accounts of chemical research* 2010; **43**: 1434-1443. doi:10.1021/ar100066t
- Recent Trends in the Evaluation of Photochemical Insertion Characteristics of Heterobifunctional Perfluoroaryl Azide Chelating Agents: Biochemical Implications in Nuclear Medicine; R. S. Pandurangi, S. R. Karra, R. R. Kuntz and W. A. Volkert; *Photochemistry and Photobiology* 1997; **65**: 208-221. doi:10.1111/j.1751-1097.1997.tb08547.x
- Tri- and Tetravalent Photoactivable Cross-Linking Agents; A. Welle, F. Billard and J. Marchand-Brynaert; *Synthesis* 2012; **44**: 2249-2254. doi:10.1055/s-0031-1290444

Prices are in EUR, net, exw Germany

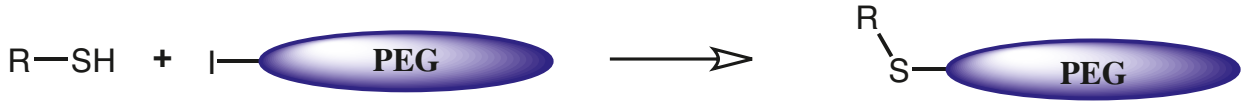
- Preservation of Immunoreactivity in the Photolabeling of the B72.3 Human Antibody; R. S. Pandurangl, S. R. Karra, R. R. Kuntz and W. A. Volkert; *Photochemistry and Photobiology* 1996; **64**: 100-105. doi:10.1111/j.1751-1097.1996.tb02427.x
- Candida albicans biofilm formation on peptide functionalized polydimethylsiloxane; K. D. Prijck, N. D. Smet, M. Rymarczyk-Machal, G. V. Driessche, B. Devreese, T. Coenye, E. Schacht and H. J. Nelis; *Biofouling* 2010; **26**: 269-275. doi:10.1080/08927010903501908

		Article No.	Quantity	Price
PEG3150 **I-PEG-N_3** alpha-Iodo-omega-azido poly(ethylene glycol) (PEG-MW 3000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG3150.0100	100 mg	€ 225,00
		PEG3150.0500	500 mg	€ 625,00
PEG3160 **I-PEG-N_3** alpha-Iodo-omega-azido poly(ethylene glycol) (PEG-MW 5000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG3160.0100	100 mg	€ 225,00
		PEG3160.0500	500 mg	€ 625,00
PEG3130 **I-PEG-N_3** alpha-Iodo-omega-azido poly(ethylene glycol) (PEG-MW 10000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG3130.0100	100 mg	€ 250,00
		PEG3130.0500	500 mg	€ 675,00
PEG3140 **I-PEG-N_3** alpha-Iodo-omega-azido poly(ethylene glycol) (PEG-MW 20000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG3140.0100	100 mg	€ 250,00
		PEG3140.0500	500 mg	€ 675,00

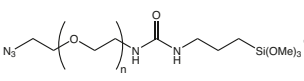
In conjugation techniques with thiol groups from Cystein or other SH carrying moieties normally maleimides are used. They react also with other acid protons like for example from OH or NH_2 and give appropriate unwanted impurities. The Iodo group reacts much more specifically with thiol resulting in much cleaner conjugates.

Reference:

- Quantitative reactivity profiling predicts functional cysteines in proteomes; E. Weerapana, C. Wang, G. M. Simon, F. Richter, S. Khare, M. B. D. Dillon, D. A. Bachovchin, K. Mowen, D. Baker and B. F. Cravatt; *Nature* 2010; **468**: 790-795. doi:10.1038/nature09472



The broad variety of the Click reaction can be applied on surfaces using appropriate PEG-silanes, where silicate particles can be coated with.

		Article No.	Quantity	Price
PEG4830 **Azido-PEG-Si(OMe)$_3$** alpha-Azido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG4830.0500	500 mg	€ 500,00
		PEG4830.1000	1 g	€ 900,00
PEG4835 **Azido-PEG-Si(OMe)$_3$** alpha-Azido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG4835.0500	500 mg	€ 500,00
		PEG4835.1000	1 g	€ 900,00
PEG4840 **Azido-PEG-Si(OMe)$_3$** alpha-Azido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG4840.0500	500 mg	€ 500,00
		PEG4840.1000	1 g	€ 900,00
PEG4845 **Azido-PEG-Si(OMe)$_3$** alpha-Azido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG4845.0500	500 mg	€ 500,00
		PEG4845.1000	1 g	€ 900,00

Prices are in EUR, net, exw Germany

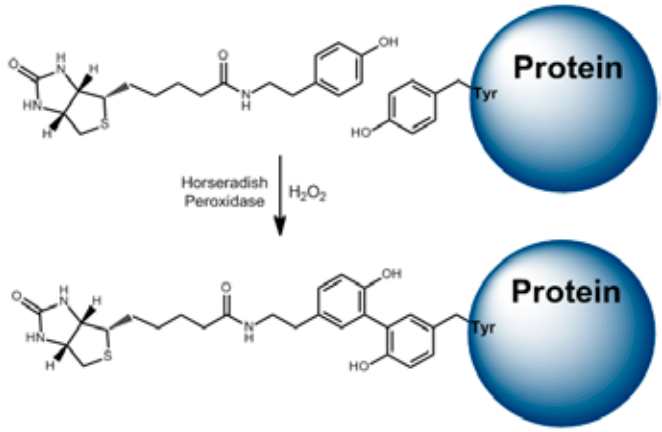
3.6 Biotin-PEG Reagents

PEG spacers eliminate the common issues of aggregation with biotinylated proteins, oligonucleotides, antibodies, and other biological materials. They provide optimal avidin/streptavidin binding, because the PEG spacer makes the biotin freely available for streptavidin in the capture/binding step.

Biotin-PEG Reagents are very water soluble, eliminate non-specific binding and are non-antigenic and non-immunogenic. They increase significantly signal to noise ratio in analytical applications.

Reagents for Tyrosine-/Protein-Biotinylation

For long time it is known that tyramine compounds are converted to highly reactive radicals by horseradish peroxidase in presence of H_2O_2. In vicinity of proteins, these radicals preferentially react with surface exposed tyrosines. Therefore biotin tyramide is a perfect reagent for protein biotinylation.



References:

- The Oxidation of Tyramine, Tyrosine, and Related Compounds by Peroxidase; A.J. Gross, I.W. Sizer; *J. Biol. Chem.* 1959; **234**: 1611-1614.
- Catalyzed reporter deposition, a novel method of signal amplification application to immunoassays; M.N. Bobrow et al.; *Journal of Immunological Methods* 1989; **125**: 279-285. doi: 10.1016/0022-1759(89)90104-X.
- Catalyzed reporter deposition, a novel method of signal amplification: II. Application to membrane immunoassays; M.N. Bobrow et al.;. *Journal of Immunological Methods* 1991; **137**: 103-112. doi: 10.1016/0022-1759(91)90399-Z.
- Tyramide signal amplification for analysis of kinase activity by intracellular flow cytometry; M.R. Clutter et al.; *Cytometry A.* 2010; **77(11)**: 1020-31; doi: 10.1002/cyto.a.20970.
- Proteomic mapping of mitochondria in living cells via spatially restricted enzymatic tagging; H.W. Rhee et al., *Science* 2013; **339**: 1328-31. doi: 10.1126/science.1230593.
- WO2008128352 A1.

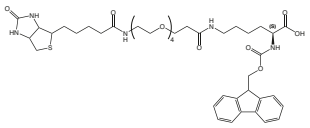
	Article No.	Quantity	Price
LS-3500 Biotin Tyramide	LS-3500.0250	250 mg	€ 125,00
(3aS,4S,6aR)-hexahydro-N-[2-(4-hydroxyphenyl)ethyl]-2-oxo-1H-thieno[3,4-d]imidazole-4-pentanamide	LS-3500.1000	1 g	€ 300,00
CAS-NO: 41994-02-9	LS-3500.5000	5 g	€ 1200,00
FORMULA: $C_{18}H_{25}N_3O_3S$			
MOLECULAR WEIGHT: 363,47 g/mole			
LS-3490 Biotin-AEEA-Phenol	LS-3490.0100	100 mg	€ 275,00
N-(2-(2-(2-(4-hydroxyphenethylamino)-2-oxoethoxy)ethoxy)ethyl)-5-((3aS,4S,6aR)-2-oxohexahydro-1H-thieno[3,4-d]imidazol-4-yl) pentanamide	LS-3490.0250	250 mg	€ 550,00
FORMULA: $C_{24}H_{36}N_4O_6S$	LS-3490.1000	1 g	€ 1750,00
MOLECULAR WEIGHT: 508,63 g/mole			
PEG2166 Biotin-PEG(4)-Lys(PEG(4)-Biotin)-PEG(4)-TFP	PEG2166.0100	100 mg	€ 250,00
N-alpha-N-epsilon-Bis(Biotinyl-PEG(4))-lysinyl-PEG(4)-2,3,5,6-tetra-fluorophenyl ester	PEG2166.0001	1 g	€ 1275,00
FORMULA: $C_{65}H_{105}F_4N_9O_{21}S_2$			
MOLECULAR WEIGHT: 1488,7 g/mole			
FURTHER INFORMATION: Spacer length 40 and 35 atoms or 43.4 and 41.7 A, resp.			

PEG2166 is an **amine reactive bis-biotinylation PEGylating reagent** with a PEG spacer arm with potential to polymerize avidin or streptavidin at the label site. Very water soluble, hydrophilic and eliminates nonspecific binding.

Prices are in EUR, net, exw Germany

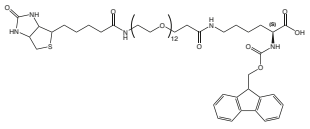
	Article No.	Quantity	Price
PEG4440 Fmoc-L-Lys(dPEG™(4)-Biotin)-OH	PEG4440.0100	100 mg	€ 265,00
	PEG4440.1000	1 g	€ 1150,00

N-alpha-(9-Fluorenylmethyloxycarbonyl)-N-epsilon-[15-(biotinamido)-4,7,10,13-tetraoxa-pentadecanoyl]-L-lysine
CAS-NO: 1334172-64-3
FORMULA: $C_{42}H_{59}N_5O_{11}S$
MOLECULAR WEIGHT: 842,01 g/mole
FURTHER INFORMATION: Spacer length 19.1 atoms or 16 A



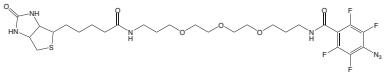
PEG4450 Fmoc-L-Lys(dPEG™(12)-Biotin)-OH	PEG4450.0100	100 mg	€ 385,00
	PEG4450.1000	1 g	€ 1550,00

N-alpha-(9-Fluorenylmethyloxycarbonyl)-N-epsilon-[alpha-Biotin-omega-propionyl dodeca(ethylene glycol)]-L-lysine
CAS-NO: 1334172-65-4
FORMULA: $C_{58}H_{91}N_5O_{19}S$
MOLECULAR WEIGHT: 1194,43 g/mole
FURTHER INFORMATION: Spacer length 60 atoms or 57.9 A



PEG2065 Biotin-TEG-ATFBA	PEG2065.0025	25 mg	€ 200,00
	PEG2065.0100	100 mg	€ 355,00

Biotin-triethylenglycol-(p-azido-tetrafluorobenzamide)
CAS-NO: 1264662-85-2
FORMULA: $C_{27}H_{37}F_4N_7O_6S$
MOLECULAR WEIGHT: 663,68 g/mole
FURTHER INFORMATION: Spacer length 15 atoms or 16.9 A

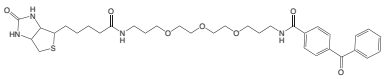


Aryl azides such as PEG2065 are well-known precursors of nitrenes and have been introduced as versatile **photoaffinity labeling agents** to probe biological receptors. Upon photolysis, N_2 is liberated and a highly unstable singlet Phenylnitrene is being formed in situ, which reacts **non-specifically** with neighboring molecules such as C-H and N-H bonds in a variety of reactions. Perfluorophenyl azides, however, form highly stabilized nitrene intermediates that undergo insertion and addition reactions in moderate to good yields rather than intermolecular rearrangements. This type of compounds has been used as photo-cross linker (Lamda max = 258nm) in estrogen receptor studies and for direct surface coating of carbon and organic based polymers.

References see page 96

PEG1415 Biotin-dPEG(3)-Benzophenone	PEG1415.0025	25 mg	€ 200,00
	PEG1415.0100	100 mg	€ 355,00
	PEG1415.1000	1 g	€ 1400,00

N-(3-(2-(2-(3-(Biotinamino)propoxy)ethoxy)ethoxy)propyl)-4-benzophenone
CAS-NO: 756525-96-9
FORMULA: $C_{34}H_{46}N_4O_7S$
MOLECULAR WEIGHT: 654,82 g/mole
FURTHER INFORMATION: Spacer length 15 atoms or 16.9 A

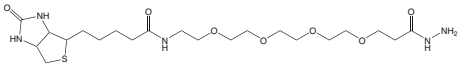


References:

- Using photolabile ligands in drug discovery and development; G. Dormán and G. D. Prestwich; *Trends in Biotechnology* **18**: 64-77. doi:10.1016/s0167-7799(99)01402-x
- Benzophenone Photophores in Biochemistry; G. Dorman and G. D. Prestwich; *Biochemistry* 1994; **33**: 5661-5673. doi:10.1021/bi00185a001
- Benzophenone Photoprobes for Phosphoinositides, Peptides and Drugs; G. D. Prestwich, G. Dormán, J. T. Elliott, D. M. Marecak and A. Chaudhary; *Photochemistry and Photobiology* 1997; **65**: 222-234. doi:10.1111/j.1751-1097.1997.tb08548.x

PEG1425 Biotin-dPEG(4)-NHNH$_2$	PEG1425.0050	50 mg	€ 325,00
	PEG1425.0001	1 g	€ 1250,00

15-Biotinamino-4,7,10,13-tetraoxa-pentadecanoyl hydrazide
CAS-NO: 756525-97-0
FORMULA: $C_{21}H_{39}N_5O_7S$
MOLECULAR WEIGHT: 505,63 g/mole
FURTHER INFORMATION: Spacer length 18 atoms or 20.6 A



PEG 1425 is a **carbonyl reactive biotinylation reagent**, which reacts with aldehydes and ketones to give stable hydrazones in a single step and avoids reductive amination. Reacts also with activated carboxylic acids.

Prevents or eliminates aggregation when labeling large biologicals. Products show less non-specific binding than conventionally biotinylated compounds.

Solubility in water: >50% w/v!

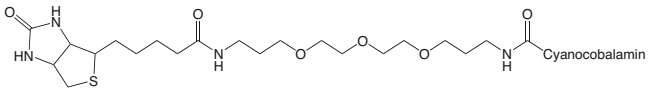
Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; **Ch. 18**: 733-736: general discussion of chemistry and properties; 736: general protocol for labeling of a glycoprotein; ISBN 978-0-12-370501-3

Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price
PEG1420 Biotin-dPEG™(3)-Cyanocobalamin	PEG1420.0005	5 mg	€ 200,00

N-(3-(2-(2-(3-(Biotinamino)propoxy)ethoxy)ethoxy)propyl)-cyanocobalamin
CAS-NO: 295329-79-2
FORMULA: $C_{83}H_{123}N_{17}O_{20}CoPS$
MOLECULAR WEIGHT: 1800,94 g/mole
FURTHER INFORMATION: Spacer length 15 atoms or 18.1 A



PEG1420 is a **biotin reagent for analytical measurements of biotin binding to streptavidin for other biotinylated species**. The reagent has been uniquely designed as a competitive standard reagent to assess the relative binding of biotin derivatives with avidin and streptavidin (on/off rate determinations). The 3 PEG unit chain provides an optimal binding distance and physical properties to balance the hydrophilicity of biotin.

References:

- Biotin Reagents for Antibody Pretargeting. 4. Selection of Biotin Conjugates for in Vivo Application Based on Their Dissociation Rate from Avidin and Streptavidin; D. S. Wilbur, M.-K. Chyan, P. M. Pathare, D. K. Hamlin, M. B. Frownfelter and B. B. Kegley; *Bioconjug Chem* 2000; **11**: 569-583. doi:10.1021/bc000024v
- Evaluation of Biotin-Dye Conjugates for Use in an HPLC Assay To Assess Relative Binding of Biotin Derivatives with Avidin and Streptavidin; D. S. Wilbur, P. M. Pathare, D. K. Hamlin, M. B. Frownfelter, B. B. Kegley, W.-Y. Leung and K. R. Gee; *Bioconjug Chem* 2000; **11**: 584-598. doi:10.1021/bc0000031

Biotin-PEG-Amines

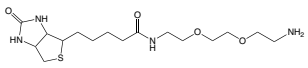
Biotin-PEG-amines react with NHS and other active esters or with aldehydes/ketones in a reductive alkylation to secondary amines. They prevent or eliminate aggregation when labeling large biologicals.

Reference and protocol:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 529-530: general discussion on biotinylation; 737-738: protocol; ISBN 978-0-12-370501-3

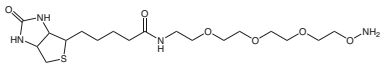
PEG2760 Biotin-DOOA*HCl	PEG2760.0250	250 mg	€ 200,00
	PEG2760.0001	1 g	€ 600,00
	PEG2760.0005	5 g	€ 2400,00

1-Biotinyl-3,6-dioxa-8-octaneamine hydrochloride
CAS-NO: 862373-14-6
FORMULA: $C_{16}H_{30}N_4O_4S*HCl$
MOLECULAR WEIGHT: 374,50*36,45 g/mole



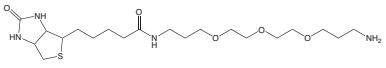
PEG5140 Biotin-TEG-O-NH_2*HCl	PEG5140.0050	50 mg	€ 175,00
	PEG5140.1000	1 g	€ 860,00

N-(2-(2-(2-(aminooxy)ethoxy)ethoxy)ethoxy)ethyl)-5-biotinamide hydrochloride
FORMULA: $C_{18}H_{34}N_4O_6S*HCl$
MOLECULAR WEIGHT: 434,55*36,45 g/mole
FURTHER INFORMATION: Spacer length 14 atoms or 15.5 A



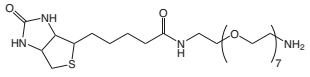
PEG2110 Biotin-TEG-NH_2*TFA	PEG2110.0100	100 mg	€ 175,00
	PEG2110.0001	1 g	€ 860,00

N-Biotin-tetra(ethylene glycol)-diamine
CAS-NO: 1334172-59-6
FORMULA: $C_{20}H_{38}N_4O_5S*CF_3CO_2H$
MOLECULAR WEIGHT: 446,60*114,02 g/mole
FURTHER INFORMATION: Spacer length 15 atoms or 18.1 A



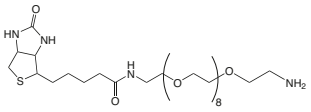
PEG4290 Biotin-dPEG™(7)-NH_2	PEG4290.0100	100 mg	€ 325,00
	PEG4290.1000	1 g	€ 1025,00

alpha-Biotin-omega-amino hepta(ethylene glycol)
CAS-NO: 1334172-76-7
FORMULA: $C_{26}H_{50}N_4O_9S$
MOLECULAR WEIGHT: 594,76 g/mole
FURTHER INFORMATION: Spacer length 25 atoms or 29.8 A

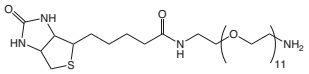
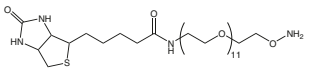
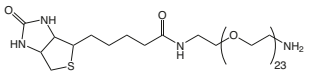
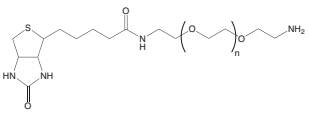
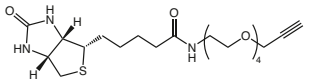
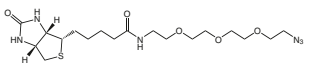
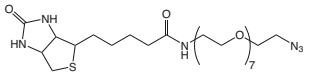
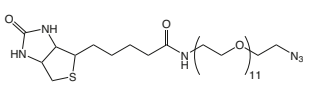


PEG1044 Biotin-PEG(9)-NH_2	PEG1044.0100	100 mg	€ 350,00
	PEG1044.0001	1 g	€ 1150,00

alpha-Biotin-omega-amino-nona(ethylene glycol)
FORMULA: $C_{30}H_{58}N_4O_{11}S$
MOLECULAR WEIGHT: 682,88 g/mole



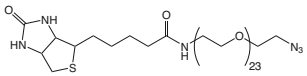
Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG4300 Biotin-dPEG™(11)-NH_2		PEG4300.0100	100 mg	€ 355,00
alpha-Biotin-omega-amino undeca(ethylene glycol) CAS-NO: 604786-74-5 FORMULA: $C_{34}H_{66}N_4O_{13}S$ MOLECULAR WEIGHT: 770,97 g/mole FURTHER INFORMATION: Spacer length 37 atoms or 44.1 A		PEG4300.1000	1 g	€ 1150,00
PEG4680 Biotin-dPEG™(11)-O-NH_2*HCl		PEG4680.0050	50 mg	€ 450,00
alpha-Biotinyl-omega-oxyamine-undeca(ethylene glycol) hydrochloride FORMULA: $C_{34}H_{66}N_4O_{14}S$ MOLECULAR WEIGHT: 786,97*36,45 g/mole		PEG4680.1000	1 g	€ 1425,00
PEG4310 Biotin-dPEG™(23)-NH_2		PEG4310.0100	100 mg	€ 385,00
alpha-Biotin-omega-amino 23(ethylene glycol) CAS-NO: 604786-74-5 FORMULA: $C_{58}H_{114}N_4O_{25}S$ MOLECULAR WEIGHT: 1299,6 g/mole FURTHER INFORMATION: Spacer length 71 atoms or 87.0 A		PEG4310.1000	1 g	€ 1250,00
PEG1046 Biotin-PEG-NH_2		PEG1046.0500	500 mg	€ 375,00
alpha-Biotin-omega-amino poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1046.0001	1 g	€ 625,00
PEG1047 Biotin-PEG-NH_2		PEG1047.0500	500 mg	€ 375,00
alpha-Biotin-omega-amino poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1047.0001	1 g	€ 625,00
PEG1045 Biotin-PEG-NH_2		PEG1045.0500	500 mg	€ 400,00
alpha-Biotin-omega-amino poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1045.0001	1 g	€ 675,00
PEG4950 Biotin-PEG(4)-alkyne		PEG4950.0250	250 mg	€ 200,00
15-[D(+)-Biotinylamino]-4,7,10,13-tetraoxapentadec-1-yne FORMULA: $C_{21}H_{35}N_3O_6S$ MOLECULAR WEIGHT: 457,58 g/mole FURTHER INFORMATION: Purity > 95% (HPLC)		PEG4950.0001	1 g	€ 650,00
PEG4940 Biotin-PEG(3)-N_3		PEG4940.0250	250 mg	€ 200,00
11-[D(+)-Biotinylamino]-1-azido-3,6,9-trioxaundecane FORMULA: $C_{18}H_{32}N_6O_5S$ MOLECULAR WEIGHT: 444,55 g/mole FURTHER INFORMATION: Purity > 95% (HPLC)		PEG4940.0001	1 g	€ 650,00
PEG4330 Biotin-dPEG™(7)-N_3		PEG4330.0100	100 mg	€ 265,00
alpha-Biotin-omega-azido hepta(ethylene glycol) CAS-NO: 1334172-75-6 FORMULA: $C_{26}H_{48}N_6O_9S$ MOLECULAR WEIGHT: 620,76 g/mole FURTHER INFORMATION: Spacer length 27 atoms or 30.7 A		PEG4330.1000	1 g	€ 1550,00
PEG4340 Biotin-dPEG™(11)-N_3		PEG4340.0100	100 mg	€ 325,00
alpha-Biotin-omega-azido undeca(ethylene glycol) CAS-NO: 956494-20-5 FORMULA: $C_{34}H_{64}N_6O_{13}S$ MOLECULAR WEIGHT: 796,97 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 50.4 A		PEG4340.1000	1 g	€ 1600,00

Prices are in EUR, net, exw Germany

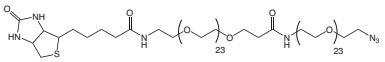
	Article No.	Quantity	Price
PEG4350 Biotin-dPEG™(23)-N_3	PEG4350.0100	100 mg	€ 385,00
	PEG4350.1000	1 g	€ 1850,00

alpha-Biotin-omega-azido 23(ethylene glycol)
CAS-NO: 956494-20-5
FORMULA: $C_{58}H_{112}N_6O_{25}S$
MOLECULAR WEIGHT: 1325,6 g/mole
FURTHER INFORMATION: Spacer length 73 atoms or 87.7 A



PEG4360 Biotin-dPEG™(47)-N_3 — please inquire!

alpha-Biotin-omega-azido 47(ethylene glycol)
FORMULA: $C_{109}H_{213}N_7O_{50}S$
MOLECULAR WEIGHT: 2453,94 g/mole
FURTHER INFORMATION: Spacer length 154 atoms or 186.5 A

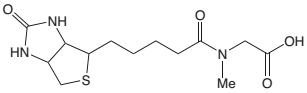


Building blocks for BIOTINIDASE RESISTANT biotinylation in serum samples

Biotinidase is ubiquitous in serum and will rapidly cleave biotin from the detection system. Sarcosine and 2-aminobutyric acid are spacers resulting in derived biotinylation reagents showing a high level of resistance to biotinidase, while maintaining a high binding rate and affinity for avidin and streptavidin.

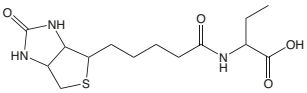
PEG2550 Biotin-Sar-OH — PEG2550.1000 | 1 g | € 325,00

N-Biotinylsarcosine
CAS-NO: 154024-76-7
FORMULA: $C_{13}H_{21}N_3O_4S$
MOLECULAR WEIGHT: 717,84 g/mole



PEG2555 Biotin-2-Abu-OH — PEG2555.0001 | 1 g | € 325,00

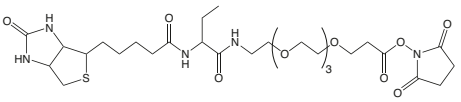
N-alpha-Biotinoyl-2-DL-aminobutyric acid
CAS-NO: 917015-56-6
FORMULA: $C_{14}H_{23}N_3O_4S$
MOLECULAR WEIGHT: 329,52 g/mole



PEG1845 Biotin-dPEG(4)-NHS-(Biotinidase resistant)

PEG1845.0100	100 mg	€	225,00
PEG1845.0001	1 g	€	1375,00

18-Biotinamino-17-oxo-4,7,10,13-tetraoxa-16-azaicosan-1-oic acid succinimidyl ester
CAS-NO: 1334172-61-0
FORMULA: $C_{29}H_{47}N_5O_{11}S$
MOLECULAR WEIGHT: 673,78 g/mole
FURTHER INFORMATION: Spacer length 19 atoms or 21.5 A



PEG1845 is very water soluble, hydrophilic, non-antigenic, non-immunogenic and eliminates non-specific binding. The PEGylation arm of this spacer gives optimal biotin binding with streptavidin conjugates, designed with the same length as the well-established LC-LC spacer, but with superior solubiltity charactreistics, which significantly increases signal to noise ratio in analytical applications.

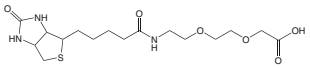
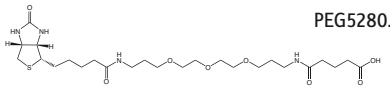
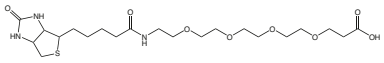
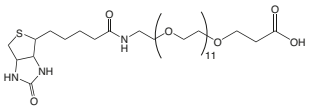
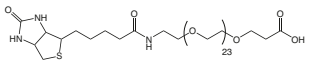
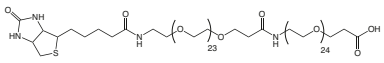
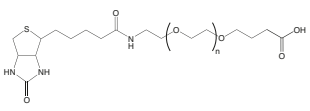
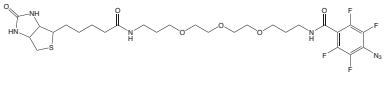
Protocol:

The pegylation reagent can be pre-dissolved in an organic solvent or can be directly dissolved in pure water, but must be used immediately. The reaction is best run between pH 7.2 and 8 using a non-amine buffer, e.g., PBS pH 7.2. Typical incubation times will be about 2 hours on ice and 30 minutes at RT. For large molecules the unreacted biotinylation reagent can be removed with gel filtration or dialysis.

References:

- Biotin Reagents for Antibody Pretargeting. 7. Investigation of Chemically Inert Biotinidase Blocking Functionalities for Synthetic Utility; D. S. Wilbur, D. K. Hamlin and M.-K. Chyan; *Bioconjug Chem* 2006; **17**: 1514-1522. doi:10.1021/bc060084m
- Biotin Reagents for Antibody Pretargeting. 5. Additional Studies of Biotin Conjugate Design To Provide Biotinidase Stability; D. S. Wilbur, D. K. Hamlin, M.-K. Chyan, B. B. Kegley and P. M. Pathare; *Bioconjug Chem* 2001; **12**: 616-623. doi:10.1021/bc0100096
- Biotin Reagents for Antibody Pretargeting. Synthesis, Radioiodination, and in Vitro Evaluation of Water Soluble, Biotinidase Resistant Biotin Derivatives; D. S. Wilbur, D. K. Hamlin, P. M. Pathare and S. A. Weerawarna; *Bioconjug Chem* 1997; **8**: 572-584. doi:10.1021/bc9700852

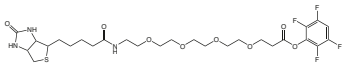
Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG2560 Biotinyl-O2Oc-OH 8-Biotinylamido-3,6-dioxaoctanoic acid CAS-NO: 1238575-77-3 FORMULA: $C_{16}H_{27}N_3O_6S$ MOLECULAR WEIGHT: 389,47 g/mole		PEG2560.0001 PEG2560.0005	1 g 5 g	€ 250,00 € 1000,00
PEG2565 Biotinyl-O2Oc-O2Oc-OH 8-Biotinylamido-3,6-dioxaoctanoic acid dimer FORMULA: $C_{22}H_{38}N_4O_9S$ MOLECULAR WEIGHT: 534,62 g/mole		PEG2565.0250 PEG2565.0001 PEG2565.0005	250 mg 1 g 5 g	€ 185,00 € 500,00 € 2000,00
PEG5280 Biotin-TOTA-glutaramic acid*DIPEA 5,21-dioxo-25-((3aS,4S,6aR)-2-oxohexahydro-1H-thieno[3,4-d] imidazol-4-yl)-10,13,16-trioxa-6,20-diazapentacosan-1-oic acid diisopropylethylamine salt FORMULA: $C_{25}H_{44}N_4O_8S*C_8H_{19}N$ MOLECULAR WEIGHT: 560,70*129,30 g/mole		PEG5280.0250 PEG5280.1000 PEG5280.5000	250 mg 1 g 5 g	€ 150,00 € 400,00 € 1600,00
PEG1515 Biotin-dPEG(4)-COOH 15-Biotinamino-4,7,10,13-tetraoxa-pentadecanoic acid CAS-NO: 721431-18-1 FORMULA: $C_{21}H_{37}N_3O_8S$ MOLECULAR WEIGHT: 491,6 g/mole		PEG1515.0250 PEG1515.0001	250 mg 1 g	€ 225,00 € 650,00
PEG1051 Biotin-PEG(12)-COOH alpha-Biotin-omega-(propionic acid)-dodecae(ethylene glycol) CAS-NO: 948595-11-7 FORMULA: $C_{37}H_{69}N_3O_{16}S$ MOLECULAR WEIGHT: 844,04 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 47.6 A		PEG1051.0100 PEG1051.0001	100 mg 1 g	€ 225,00 € 1150,00
PEG4260 Biotin-dPEG™(24)-COOH alpha-Biotin-omega-(propionic acid) 24(ethylene glycol) CAS-NO: 721431-18-1 FORMULA: $C_{61}H_{117}N_3O_{28}S$ MOLECULAR WEIGHT: 1372.65 g/mole FURTHER INFORMATION: Spacer length 76 atoms or 95.7 A		PEG4260.0100 PEG4260.1000	100 mg 1 g	€ 295,00 € 1550,00
PEG4270 Biotin-dPEG™(48)-COOH alpha-Biotin-omega-(propionic acid) 48(ethylene glycol) CAS-NO: 721431-18-1 FORMULA: $C_{112}H_{218}N_4O_{53}S$ MOLECULAR WEIGHT: 2500,99 g/mole FURTHER INFORMATION: Spacer length 157 atoms or 187.7 A		PEG4270.0100 PEG4270.1000	100 mg 1 g	€ 385,00 € 1750,00
PEG1053 Biotin-PEG-COOH alpha-Biotin-omega-carboxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1053.0500 PEG1053.0001	500 mg 1 g	€ 420,00 € 720,00
PEG1054 Biotin-PEG-COOH alpha-Biotin-omega-carboxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1054.0500 PEG1054.0001	500 mg 1 g	€ 420,00 € 720,00
PEG1052 Biotin-PEG-COOH alpha-Biotin-omega-carboxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1052.0500 PEG1052.0001	500 mg 1 g	€ 450,00 € 775,00
PEG2065 Biotin-TEG-ATFBA Biotin-triethylenglycol-(p-azido-tetrafluorobenzamide) CAS-NO: 1264662-85-2 FORMULA: $C_{27}H_{37}F_4N_7O_6S$ MOLECULAR WEIGHT: 663,68 g/mole FURTHER INFORMATION: Spacer length 15 atoms or 16.9 A		PEG2065.0025 PEG2065.0100	25 mg 100 mg	€ 200,00 € 355,00

Prices are in EUR, net, exw Germany

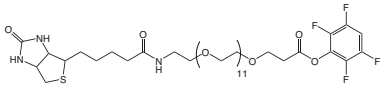
	Article No.	Quantity	Price
PEG2071 Biotin-TEG-OTfp	PEG2071.0100	100 mg	€ 175,00
	PEG2071.1000	1 g	€ 695,00

Biotin-tetra(ethylene glycol)-2,3,5,6-tetrafluorphenyl ester
FORMULA: $C_{27}H_{37}F_4N_3O_8S$
MOLECULAR WEIGHT: 639.66 g/mole



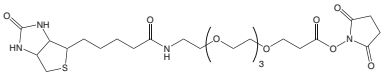
PEG5130 Biotin-PEG(12)-TFP	PEG5130.0100	100 mg	€ 225,00
	PEG5130.1000	1 g	€ 1150,00

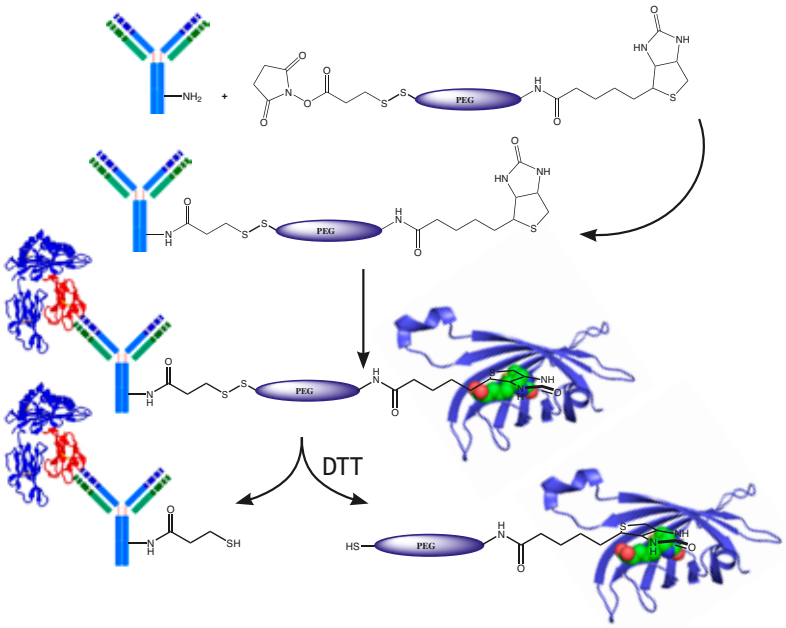
alpha-Biotin-omega-propionic acid (2,3,5,6-tetrafluorophenyl) ester dodeca(ethylene glycol)
FORMULA: $C_{43}H_{69}F_4N_3O_{16}S$
MOLECULAR WEIGHT: 992,08 g/mole
FURTHER INFORMATION: Spacer length 40 atoms or 47.6 A



PEG1870 Biotin-dPEG(4)-NHS	PEG1870.0050	50 mg	€ 175,00
	PEG1870.0001	1 g	€ 860,00

15-Biotinamino-4,7,10,13-tetraoxa-pentadecanoic acid succinimidyl ester
CAS-NO: 459426-22-3
FORMULA: $C_{25}H_{40}N_4O_{10}S$
MOLECULAR WEIGHT: 588,67 g/mole
FURTHER INFORMATION: Spacer length 16 atoms or 19.2 A





antibody-antigen complex

streptavidin-biotin complex

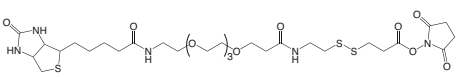
Biotin-PEG-S-S-NHS *can be used to label a primary antibody molecule that has specificity for a certain protein. Incubation of the biotinylated antibody with a sample, such as a cell lysate, allows the antibody to bind to its target. Capture of the antibody-antigen complex on an immobilized streptavidin reagent effectively isolates the target protein from the other proteins in the sample. The disulfide linkage in the spacer arm of the biotin tag permits elution of the immune complex from the streptavidin support under mild conditions by using DTT. Otherwise strong denaturating conditions typically required to break the streptavidin-biotin interaction have to be applied.*

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 726-729; ISBN 978-0-12-370501-3

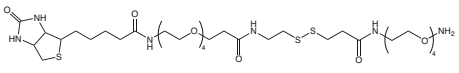
PEG1910 Biotin-dPEG(4)-S-S-NHS	PEG1910.0050	50 mg	€ 235,00
	PEG1910.0500	500 mg	€ 990,00

1-Biotinamino-15-oxo-3,6,9,12-tetraoxa-19,20-dithia-16-azatricosan-23-oic acid succinimidyl ester
CAS-NO: 1260247-51-5
FORMULA: $C_{30}H_{49}N_5O_{11}S_3$
MOLECULAR WEIGHT: 751,93 g/mole
FURTHER INFORMATION: Spacer length 24 atoms or 28.7 A

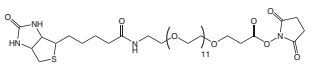
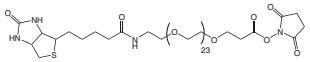
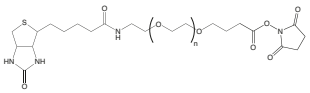
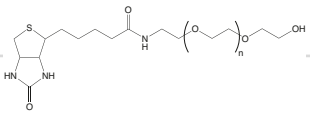
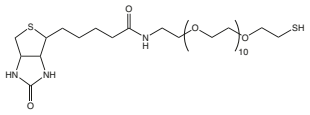
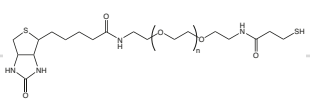


PEG5150 Biotin-dPEG™(4)-SS-dPEG™(3)-O-NH_2*HCl	PEG5150.0050	50 mg	€ 290,00
	PEG5150.0500	500 mg	€ 1200,00
	PEG5150.1000	1 g	€ 2050,00

1-Biotinamido-16,24-diaza-3,6,9,12,27,30,33-heptaoxa-15,23-dioxo-19,20-dithia-36-aminoxy-hexatriacontane hydrochloride
FORMULA: $C_{34}H_{64}N_6O_{12}S_3$*HCl
MOLECULAR WEIGHT: 845,10*36,45 g/mole
FURTHER INFORMATION: Spacer length 38 atoms or 46.1 A



Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG1860 Biotin-dPEG(12)-NHS alpha-Biotin-omega-carboxy succinimidyl ester dodeca(ethylene glycol) CAS-NO: 365441-71-0 FORMULA: $C_{41}H_{72}N_4O_{18}S$ MOLECULAR WEIGHT: 941,09 g/mole FURTHER INFORMATION: Spacer length 40 atoms or 47.6 A		PEG1860.0050 PEG1860.0001	50 mg 1 g	€ 225,00 € 1425,00
PEG4250 Biotin-dPEG™(24)-NHS alpha-Biotin-omega-(succinimidyl propionate) 24(ethylene glycol) CAS-NO: 365441-71-0 FORMULA: $C_{65}H_{120}N_4O_{30}S$ MOLECULAR WEIGHT: 1469,72 g/mole FURTHER INFORMATION: Spacer length 81 atoms or 97.7 A		PEG4250.0050 PEG4250.1000	50 mg 1 g	€ 325,00 € 1600,00
PEG1056 Biotin-PEG-NHS alpha-Biotin-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1056.0100 PEG1056.0500 PEG1056.0001	100 mg 500 mg 1 g	€ 140,00 € 475,00 € 830,00
PEG1057 Biotin-PEG-NHS alpha-Biotin-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1057.0500 PEG1057.0001	500 mg 1 g	€ 475,00 € 830,00
PEG1055 Biotin-PEG-NHS alpha-Biotin-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1055.0100 PEG1055.0500 PEG1055.0001	100 mg 500 mg 1 g	€ 150,00 € 500,00 € 900,00
PEG1206 Biotin-PEG-OH alpha-Biotin-omega-hydroxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1206.0500 PEG1206.1000	500 mg 1 g	€ 800,00 € 1300,00
PEG1207 Biotin-PEG-OH alpha-Biotin-omega-hydroxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1207.0500 PEG1207.1000	500 mg 1 g	€ 800,00 € 1300,00
PEG4705 Biotin-PEG(11)-SH alpha-Biotin-omega-mercapto undeca(ethylene glycol) FORMULA: $C_{34}H_{65}N_3O_{13}S_2$ MOLECULAR WEIGHT: 788,02 g/mole		PEG4705.0100 PEG4705.1000	100 mg 1 g	€ 450,00 € 1300,00
PEG1213 Biotin-PEG-SH alpha-Biotin-omega-mercapto poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1213.0100 PEG1213.0500 PEG1213.0001	100 mg 500 mg 1 g	€ 350,00 € 1050,00 € 1950,00
PEG1214 Biotin-PEG-SH alpha-Biotin-omega-mercapto poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1214.0100 PEG1214.0500 PEG1214.0001	100 mg 500 mg 1 g	€ 350,00 € 1050,00 € 1950,00
PEG1212 Biotin-PEG-SH alpha-Biotin-omega-mercapto poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1212.0100 PEG1212.0500 PEG1212.0001	100 mg 500 mg 1 g	€ 375,00 € 1100,00 € 2000,00
PEG1226 Biotin-PEG-SH alpha-Biotin-omega-mercapto poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1226.0100 PEG1226.0500 PEG1226.1000	100 mg 500 mg 1 g	€ 375,00 € 1100,00 € 2000,00

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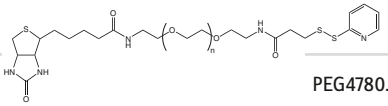
	Article No.	Quantity	Price
PEG4770 Biotin-PEG-OPSS alpha-Biotin-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG4770.0500	500 mg	€ 800,00
	PEG4770.1000	1 g	€ 1400,00
PEG4775 Biotin-PEG-OPSS alpha-Biotin-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG4775.0500	500 mg	€ 800,00
	PEG4775.1000	1 g	€ 1400,00
PEG4780 Biotin-PEG-OPSS alpha-Biotin-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG4780.0500	500 mg	€ 800,00
	PEG4780.1000	1 g	€ 1400,00
PEG4785 Biotin-PEG-OPSS alpha-Biotin-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da	PEG4785.0500	500 mg	€ 800,00
	PEG4785.1000	1 g	€ 1400,00



PEGS for Thiol Biotinylation

Conventional thiol reactive biotinylation reagents are very hydrophobic, which limits practical and commercial use due to low solubility, aggregation and precipitation of biotinylated species.

PEGylation spacers make the reagent water soluble, eliminates non-specific binding in the application and increases signal to noise ratio in analytical measurements.

They are non-antigenic and non-immunogenic.

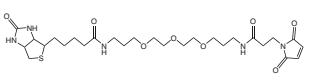
Biotin-PEG-Maleimides biotinylate sulfhydryl containing peptides and proteins or terminal sulfhydryl modified DNA at acidic to neutral pH, due to the high reactivity of the maleimide with thiols/sulfhydryls. In solution there are no aggregation or precipitation problems when labeling antibodies and other biological material.

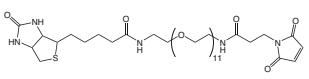
Longer spacers may allow biotin accessibility of the biotin by the streptavidin/avidin conjugate binding system where the reactive thiols are buried in the labeled system, away from the surface.

References and Protocols:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 732-733; ISBN 978-0-12-370501-3
- Biotin Reagents for Antibody Pretargeting. 2. Synthesis and in Vitro Evaluation of Biotin Dimers and Trimers for Cross-Linking of Streptavidin; D. S. Wilbur, P. M. Pathare, D. K. Hamlin and S. A. Weerawarna; *Bioconjug Chem* 1997; **8**: 819-832. doi:10.1021/bc970053e
- Biotin Reagents for Antibody Pretargeting. 3. Synthesis, Radioiodination, and Evaluation of Biotinylated Starburst Dendrimers; D. S. Wilbur, P. M. Pathare, D. K. Hamlin, K. R. Buhler and R. L. Vessella; *Bioconjug Chem* 1998; **9**: 813-825. doi:10.1021/bc980055e

PEG1605 Biotin-dPEG(3)-mal N-(3-(2-(2-(3-(Biotinamino)propoxy)ethoxy)ethoxy)propyl)-3-maleimidylpropanamide CAS-NO: 525573-2-2 FORMULA: $C_{27}H_{43}N_5O_8S$ MOLECULAR WEIGHT: 597,72 g/mole FURTHER INFORMATION: Spacer length 21 atoms or 24.9 A	PEG1605.0250	250 mg	€ 225,00
	PEG1605.0001	1 g	€ 650,00
PEG1595 Biotin-dPEG(11)-mal alpha-Biotin-omega-maleimido undeca(ethylene glycol) CAS-NO: 1334172-60-9 FORMULA: $C_{41}H_{71}N_5O_{16}S$ MOLECULAR WEIGHT: 922,09 g/mole FURTHER INFORMATION: Spacer length 43 atoms or 50.5 A	PEG1595.0025	25 mg	€ 295,00
	PEG1595.0100	100 mg	€ 525,00





For biotinylation of antibodies see our „Diagnostic Tools“ brochure.

Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price
PEG4320 Biotin-dPEG™(23)-mal	PEG4320.0025	25 mg	€ 325,00
alpha-Biotin-omega-maleimido 23(ethylene glycol) CAS-NO: 1334172-60-9 FORMULA: $C_{65}H_{119}N_5O_{28}S$ MOLECULAR WEIGHT: 1450,72 g/mole FURTHER INFORMATION: Spacer length 77 atoms or 94.1 A	PEG4320.0100	100 mg	€ 575,00
PEG1049 Biotin-PEG-mal	PEG1049.0500	500 mg	€ 500,00
alpha-Biotin-omega-maleimido poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG1049.0001	1 g	€ 850,00
PEG1050 Biotin-PEG-mal	PEG1050.0500	500 mg	€ 500,00
alpha-Biotin-omega-maleimido poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG1050.0001	1 g	€ 850,00
PEG1048 Biotin-PEG-mal	PEG1048.0500	500 mg	€ 550,00
alpha-Biotin-omega-maleimido poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG1048.0001	1 g	€ 900,00
PEG2080 Biotin-TEG-Biotin	PEG2080.0050	50 mg	€ 175,00
N,N'-Bisbiotin-tetra(ethylene glycol)-diamine CAS-NO: 194920-54-2 FORMULA: $C_{30}H_{52}N_6O_7S_2$ MOLECULAR WEIGHT: 672,9 g/mole FURTHER INFORMATION: Spacer length 15 atoms or 18.1 A	PEG2080.0001	1 g	€ 860,00
PEG4850 Biotin-PEG-Si(OMe)$_3$	PEG4850.0500	500 mg	€ 500,00
alpha-Biotinyl-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da FURTHER INFORMATION: Shipping with dry ice required! Transport costs strongly depend on destination. Please inquire!	PEG4850.1000	1 g	€ 900,00
PEG4855 Biotin-PEG-Si(OMe)$_3$	PEG4855.0500	500 mg	€ 500,00
alpha-Biotinyl-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da FURTHER INFORMATION: Shipping with dry ice required! Transport costs strongly depend on destination. Please inquire!	PEG4855.1000	1 g	€ 900,00
PEG4860 Biotin-PEG-Si(OMe)$_3$	PEG4860.0500	500 mg	€ 500,00
alpha-Biotinyl-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da FURTHER INFORMATION: Shipping with dry ice required! Transport costs strongly depend on destination. Please inquire!	PEG4860.1000	1 g	€ 900,00
PEG4865 Biotin-PEG-Si(OMe)$_3$	PEG4865.0500	500 mg	€ 500,00
alpha-Biotinyl-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da FURTHER INFORMATION: Shipping with dry ice required! Transport costs strongly depend on destination. Please inquire!	PEG4865.1000	1 g	€ 900,00

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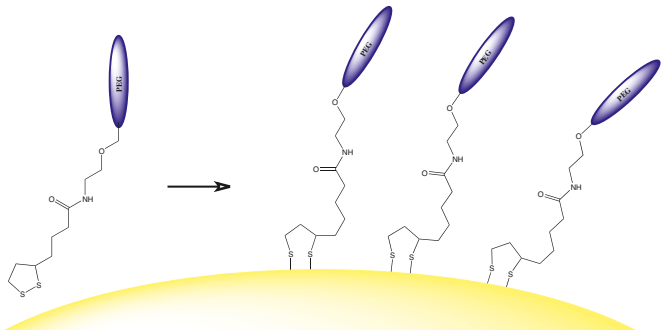
3.7 PEG-Thiols

3.7.1 Lipoamide-PEGs

Nanotechnology and nanobiotechnology using gold or silver particles, quantum dots or even magnetic particles are broadly diverse, rapidly expanding areas of study in medical diagnostics and therapeutics, sensoric and chemistry. Metal particles, however, are not water soluble without further modification. Thiols readily form dative bonds to gold and silver surfaces creating self-assembled monolayers (SAMs) which modify surfaces for coupling proteins and other molecules. Monothiols, however, can be readily removed by reducing agents such as DTT (Cleland's Reagent). The disulfide lipoic acid (also known as thioctic acid) binds far stronger to metal surfaces and is much more resistant towards removal from the metal surface by DTT and similar reagents than monothiols.

PEG linkers impart hydrophilicity, non-antigenicity and non-immunogenicity to nanoparticles. With the methoxy-capped PEG linker a water shell can be created around the nanoparticle. Lipoamido-PEG-acids and lipoamido-PEG-alcohols can be used as intermediates for derivatizing the PEG linker after attaching to the surface. A co-coating with methoxy-PEG-lipoamides will specifically reduce the density of functional groups on the surface. This is essential if interaction with large molecules like proteins and antibodies is expected.

Stench is often operative for thiols! Lipoic acid derivatives, however, have NO ODOR.



Protocol:

A variety of protocols exist in the literature and on various websites for reducing lipoic acid (LA) to dihydrolipoic acid (DHLA). Both Tris(2-carboxyethyl)phosphine (TCEP) and sodium borohydride (NaBH4) have been used successfully for reduction of LA to DHLA. For specific procedures, please consult literature. In general, TCEP reduction is carried out in water or aqueous buffer (excluding phosphate buffer, in which TCEP is unstable), in three times or greater molar excess to the lipoic acid derivative, using an incubation temperature of 25°C to 50°C, for about 1-2 hours. Each reduction procedure must be optimized for the particular lipoic acid derivative being reduced to the corresponding DHLA derivative.

References:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 188-190, 485-497, 924-935; ISBN 978-0-12-370501-3
- Self-assembled organic monolayers: model systems for studying adsorption of proteins at surfaces; K. Prime and G. Whitesides; *Science* 1991; **252**: 1164-1167. doi:10.1126/science.252.5009.1164
- Biosensing with Luminescent Semiconductor Quantum Dots; K. Sapsford, T. Pons, I. Medintz and H. Mattoussi; *Sensors* 2006; **6**: 925-953.
- Enhanced oligonucleotide-nanoparticle conjugate stability using thioctic acid modified oligonucleotides; J. A. Dougan, C. Karlsson, W. E. Smith and D. Graham; *Nucleic Acids Res* 2007; **35**: 3668-3675. doi:10.1093/nar/gkm237
- Design of biotin-functionalized luminescent quantum dots; K. Susumu, H. T. Uyeda, I. L. Medintz and H. Mattoussi; *J Biomed Biotechnol* 2007; **90651**: 90651. doi:10.1155/2007/90651
- Toward Reliable Gold Nanoparticle Patterning On Self-Assembled DNA Nanoscaffold; J. Sharma, R. Chhabra, C. S. Andersen, K. V. Gothelf, H. Yan and Y. Liu; *J Am Chem Soc* 2008; **130**: 7820-7821. doi:10.1021/ja802853r
- Simultaneous determination of α-lipoic acid and its reduced form by high-performance liquid chromatography with fluorescence detection; S. Satoh, T. Toyo'oka, T. Fukushima and S. Inagaki; *Journal of Chromatography B* 2007; **854**: 109-115. doi:10.1016/j.jchromb.2007.04.003
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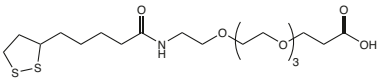
- Oriented Immobilization of Antibodies with GST-Fused Multiple Fc-Specific B-Domains on a Gold Surface; T. H. Ha, S. O. Jung, J. M. Lee, K. Y. Lee, Y. Lee, J. S. Park and B. H. Chung; *Anal Chem* 2007; **79**: 546-556. doi:10.1021/ac061639+
- Polyethylene glycol-based bidentate ligands to enhance quantum dot and gold nanoparticle stability in biological media; B. C. Mei, K. Susumu, I. L. Medintz and H. Mattoussi; *Nat. Protocols* 2009; **4**: 412-423. doi:10.1038/nprot.2008.243
- Influence of anchoring ligands and particle size on the colloidal stability and in vivo biodistribution of polyethylene glycol-coated gold nanoparticles in tumor-xenografted mice; G. Zhang, Z. Yang, W. Lu, R. Zhang, Q. Huang, M. Tian, L. Li, D. Liang and C. Li; *Biomaterials* 2009; **30**: 1928-1936. doi:10.1016/j.biomaterials.2008.12.038
- Modular poly(ethylene glycol) ligands for biocompatible semiconductor and gold nanocrystals with extended pH and ionic stability; B. C. Mei, K. Susumu, I. L. Medintz, J. B. Delehanty, T. J. Mountziaris and H. Mattoussi; *Journal of Materials Chemistry* 2008; **18**: 4949-4958. doi:10.1039/b810488c

Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price

PEG3500 Lipoamide-dPEG™(4)-COOH

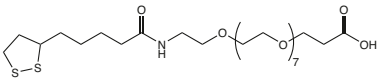
alpha-Lipoamide-omega-(propionic acid) tetra(ethylene glycol)
CAS-NO: 1334172-69-8
FORMULA: $C_{19}H_{35}NO_7S_2$
MOLECULAR WEIGHT: 453,61 g/mole
FURTHER INFORMATION: Spacer length 24 atoms or 27.5 A



PEG3500.0100	100 mg	€	265,00
PEG3500.1000	1 g	€	925,00

PEG3510 Lipoamide-dPEG™(8)-COOH

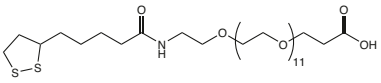
alpha-Lipomide-omega-(propionic acid) octa(ethylene glycol)
CAS-NO: 1334172-70-1
FORMULA: $C_{27}H_{51}NO_{11}S_2$
MOLECULAR WEIGHT: 629,82 g/mole
FURTHER INFORMATION: Spacer length 36 atoms or 41.2 A



PEG3510.0100	100 mg	€	325,00
PEG3510.1000	1 g	€	1350,00

PEG3520 Lipoamide-dPEG™(12)-COOH

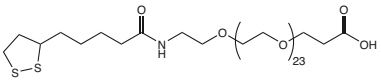
alpha-Lipoamide-omega-(propionic acid) dodeca(ethylene glycol)
CAS-NO: 1334172-71-2
FORMULA: $C_{35}H_{67}NO_{15}S_2$
MOLECULAR WEIGHT: 806,03 g/mole
FURTHER INFORMATION: Spacer length 48 atoms or 55.5 A



PEG3520.0100	100 mg	€	385,00
PEG3520.1000	1 g	€	1425,00

PEG3540 Lipoamide-dPEG™(24)-COOH

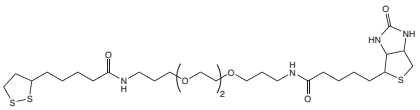
alpha-Lipoamide-omega-(propionic acid) 24(ethylene glycol)
CAS-NO: 1334172-71-2
FORMULA: $C_{59}H_{115}NO_{27}S_2$
MOLECULAR WEIGHT: 1324,66 g/mole
FURTHER INFORMATION: Spacer length 84 atoms or 99.0 A



PEG3540.0100	100 mg	€	515,00
PEG3540.1000	1 g	€	1600,00

PEG3570 Lipoamide-dPEG™(3)-biotin

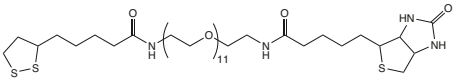
alpha-Lipoamide-omega-biotinyl tri(ethylene glycol)
CAS-NO: 1334172-74-5
FORMULA: $C_{28}H_{50}N_4O_6S_3$
MOLECULAR WEIGHT: 634,91 g/mole
FURTHER INFORMATION: Spacer length 22 atoms or 27.7 A



PEG3570.0100	100 mg	€	325,00
PEG3570.1000	1 g	€	1150,00

PEG3580 Lipoamide-dPEG™(11)-biotin

alpha-Lipoamide-omega-biotinyl undeca(ethylene glycol)
CAS-NO: 960069-81-2
FORMULA: $C_{42}H_{78}N_4O_{14}S_3$
MOLECULAR WEIGHT: 959,28 g/mole
FURTHER INFORMATION: Spacer length 43 atoms or 52.9 A

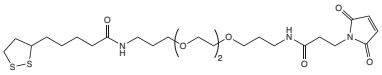


PEG3580.0100	100 mg	€	455,00
PEG3580.1000	1 g	€	1425,00

Maleimide provides functionality for antibody immobilization, as well as peptides and oligonucleotides.

PEG3550 Lipoamide-dPEG™(3)-mal

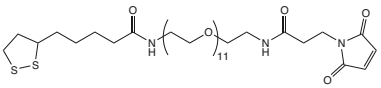
alpha-Lipoamide-omega-maleimido tri(ethylene glycol)
CAS-NO: 1334172-72-3
FORMULA: $C_{25}H_{41}N_3O_7S_2$
MOLECULAR WEIGHT: 559,74 g/mole
FURTHER INFORMATION: Spacer length 27 atoms or 31.1 A



PEG3550.0100	100 mg	€	295,00
PEG3550.1000	1 g	€	1025,00

PEG3560 Lipoamide-dPEG™(11)-mal

alpha-Lipoamide-omega-maleimido undeca(ethylene glycol)
CAS-NO: 1334172-73-4
FORMULA: $C_{39}H_{69}N_3O_{15}S_2$
MOLECULAR WEIGHT: 884,11 g/mole
FURTHER INFORMATION: Spacer length 49 atoms or 59.3 A



PEG3560.0100	100 mg	€	420,00
PEG3560.1000	1 g	€	1250,00

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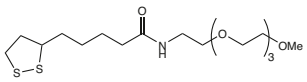
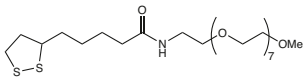
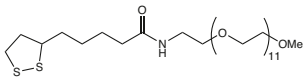
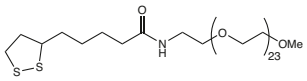
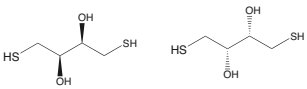
		Article No.	Quantity	Price
PEG3590	**Lipoamide-dPEG™(4)-OMe**	PEG3590.0100	100 mg	€ 225,00
alpha-Lipoamide-omega-methoxy tetra(ethylene glycol) CAS-NO: 1334172-66-5 FORMULA: $C_{17}H_{33}NO_5S_2$ MOLECULAR WEIGHT: 395,58 g/mole FURTHER INFORMATION: Spacer length 21 atoms or 23.9 A		PEG3590.1000	1 g	€ 800,00
PEG3600	**Lipoamide-dPEG™(8)-OMe**	PEG3600.0100	100 mg	€ 265,00
alpha-Lipoamide-omega-methoxy octa(ethylene glycol) CAS-NO: 1334172-67-6 FORMULA: $C_{25}H_{49}NO_9S_2$ MOLECULAR WEIGHT: 571,79 g/mole FURTHER INFORMATION: Spacer length 34.5 atoms or 38.8 A		PEG3600.1000	1 g	€ 1150,00
PEG3610	**Lipoamide-dPEG™(12)-OMe**	PEG3610.0100	100 mg	€ 385,00
alpha-Lipoamide-omega-methoxy dodeca(ethylene glycol) CAS-NO: 1334172-68-7 FORMULA: $C_{33}H_{65}NO_{13}S_2$ MOLECULAR WEIGHT: 748 g/mole FURTHER INFORMATION: Spacer length 46 atoms or 53.3 A		PEG3610.1000	1 g	€ 1350,00
PEG3620	**Lipoamide-dPEG™(24)-OMe**	PEG3620.0100	100 mg	€ 515,00
alpha-Lipoamide-omega-methoxy 20(ethylene glycol) CAS-NO: 1334172-68-7 FORMULA: $C_{57}H_{113}NO_{25}S_2$ MOLECULAR WEIGHT: 1276,63 g/mole FURTHER INFORMATION: Spacer length 82 atoms or 96.2 A		PEG3620.1000	1 g	€ 1475,00

Cleland's reagent, also known as **DL-Dithiothreitol** or DTT is deprotecting thiolated DNA. The terminal sulfurs of thiolated DNA have a tendency to oxidize and form dimers in solution, especially in the presence of oxygen. Dimerization significantly lowers the efficiency of subsequent coupling reactions such as DNA immobilization on gold surfaces in biosensors. Normally DTT is mixed with a DNA solution and allowed to react, and then it is removed by filtration (solid catalyst) or by chromatography (liquid form). The DTT removal procedure is also commonly called „desalting." DTT is frequently used to reduce the disulfide bonds of proteins and, in order to prevent intramolecular (cyclization) and intermolecular (oligomerisation, polymerisation) disulfide bonds from cysteine residues of proteins. However, DTT cannot reduce solvent-inaccessible disulfide bonds. Therefore reduction of disulfide bonds is sometimes carried out under denaturing conditions (e.g., at high temperatures, or in the presence of a strong denaturating agents such as 6 M guanidinium hydrochloride, 8 M urea, or 1% sodium dodecylsulfate). Contrariwise, the solvent exposure of different disulfide bonds can be assayed by their rate of reduction in the presence of DTT.

		Article No.	Quantity	Price
RL-1020	**DTT (racemic)**	RL-1020.0050	50 g	€ 300,00
DL-Dithiothreitol CAS-NO: 3483-12-3 FORMULA: $C_4H_{10}O_2S_2$ MOLECULAR WEIGHT: 154,25 g/mole		RL-1020.0100	100 g	€ 440,00
		RL-1020.0250	250 g	€ 820,00
		RL-1020.0500	500 g	€ 1340,00

Our production process does not involve carcinogenic intermediates. It is therefore a safe process, taking care of the integrity of environment and of the health of all personal involved in production and handling.

References:

- Dithiothreitol, a New Protective Reagent for SH Groups*; W. W. Cleland; *Biochemistry* 1964; **3**: 480-482. doi:10.1021/bi00892a002
- Reductive cleavage of cystine disulfides with tributylphosphine; U. T. Rüegg and J. Rudinger; *Methods in Enzymology* C. H. W. Hirs and N. T. Serge 1977; **47**: 111-116. doi:10.1016/0076-6879(77)47012-5
- From Production of Peptides in Milligram Amounts for Research to Multi-Tons Quantities for Drugs of the Future; T. Bruckdorfer, O. Marder and F. Albericio; *Current Pharmaceutical Biotechnology* 2004; **5**: 29-43. doi:10.2174/1389201043489620

Bulk quantities are under continuous production.

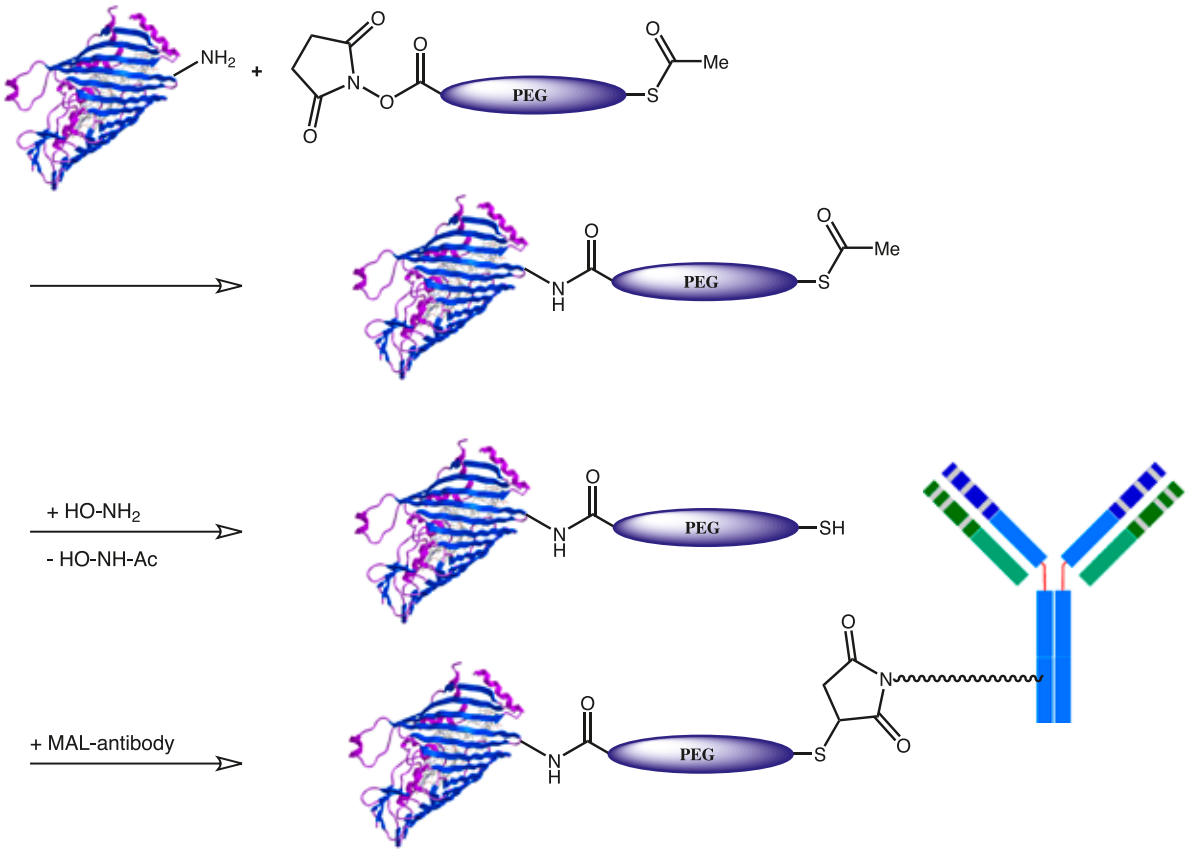
Ton lot quantities are available within short delivery time.

Prices are in EUR, net, exw Germany

3.7.2 Mercapto-PEG-Acids

S-Acetyl-PEG-acids and active esters provide a method for converting amino groups to a thiol, while incorporating PEG units. Conjugation with thiol reactive agents e.g., maleimides, vinyl sulfones or α-halo keto functionalized reaction partners increases the conjugation possibilities of the former amino group by the whole set of thiol reactive reagents.

Mercapto-PEG-Acids are highly hydrophilic, non-antigenic, non-immunogenic and non-toxic.



Protocol for in-situ Activation of PEG-Acids to the NHS ester:

Add a methylene chloride solution of the acid to the dry reagents under dry conditions (10-20% molar excess of EDC and NHS in dry methylene chloride, dried over 3A molecular sieves). Stir for several hours or overnight, then evaporate the solvent and use. The reaction mixture can also be treated with a small amount of silica gel to adsorb the excess EDC and the urea by-product. Filter, then evaporate the solvent and use.

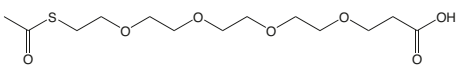
NHS should be added together with EDC to prevent formation of the anhydride. DCC and DIC can also be used. Typically use about 1 equivalent, and add a solution of the carbodiimide to the acid and NHS (1.1 to 1.2 eq.). PfOH (pentafluorophenol), MSNT (1-(Mesitylene-2-sulfonyl)-3-nitro-1,2,4-triazole), HOCt (Ethyl 1-hydroxy-1H-1,2,3-Triazole-4-carboxylate), HOPO (2-Hydroxypyridine-N-oxide) and a set of other coupling reagents/leaving groups can be used in place of NHS, if this is of any preference.

Reference and Protocols:

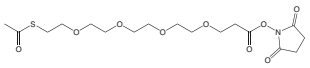
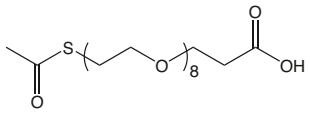
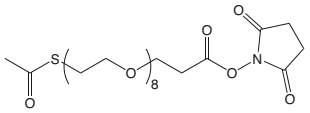
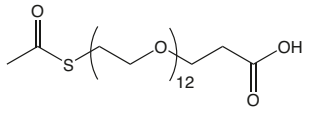
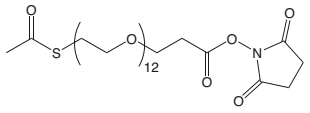
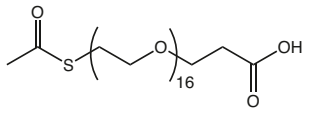
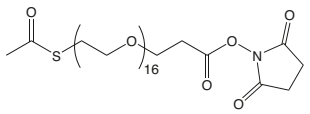
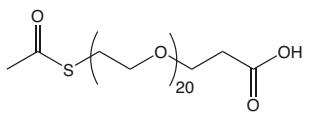
- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 71: general description and use; 795: modification of antibodies; 984 modification of amines on nucleotides and DNA probes; 90,909 and 919: modification of enzymes, reactions with avidin and streptavidin; ISBN 978-0-12-370501-3

	Article No.	Quantity	Price
PEG1940 Ac-S-dPEG(4)-COOH	PEG1940.0100	100 mg	€ 275,00
	PEG1940.0001	1 g	€ 1350,00

15-Acetylthio-4,7,10,13-tetraoxa-pentadecanoic acid
CAS-NO: 1263044-79-6
FORMULA: $C_{13}H_{24}O_7S$
MOLECULAR WEIGHT: 324,39 g/mole
FURTHER INFORMATION: Spacer length 16 atoms or 18.3 A



Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG1945 Ac-S-dPEG(4)-NHS 15-Acetylthio-4,7,10,13-tetraoxa-pentadecanoic acid succinimidyl ester CAS-NO: 937025-17-7 FORMULA: $C_{17}H_{24}NO_9S$ MOLECULAR WEIGHT: 421,46 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 18.3 A		PEG1945.0100 PEG1945.0001	100 mg 1 g	€ 310,00 € 1425,00
PEG1950 Ac-S-dPEG(8)-COOH 1-Acetylthio-3,6,9,12,15,18,21,24-octaoxaheptacosan-27-oic acid CAS-NO: 1334177-83-1 FORMULA: $C_{21}H_{40}O_{11}S$ MOLECULAR WEIGHT: 500,6 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 32.5 A		PEG1950.0100 PEG1950.0001	100 mg 1 g	€ 275,00 € 1350,00
PEG1955 Ac-S-dPEG(8)-NHS 1-Acetylthio-3,6,9,12,15,18,21,24-octaoxaheptacosan-27-oic acid succinimidyl ester CAS-NO: 1070798-99-0 FORMULA: $C_{25}H_{43}NO_{13}S$ MOLECULAR WEIGHT: 597,67 g/mole FURTHER INFORMATION: Spacer length 28 atoms and 32.5 A		PEG1955.0100 PEG1955.0001	100 mg 1 g	€ 455,00 € 1425,00
PEG3660 Ac-S-dPEG™(12)-COOH alpha-Acetylthio-omega-(propionic acid) dodeca(ethylene glycol) CAS-NO: 956497-30-6 FORMULA: $C_{29}H_{56}O_{15}S$ MOLECULAR WEIGHT: 676,81 g/mole FURTHER INFORMATION: Spacer length 39 atoms or 46.8 A		PEG3660.0100 PEG3660.1000	100 mg 1 g	€ 450,00 € 1425,00
PEG3630 Ac-S-dPEG™(12)-NHS alpha-Acethylthio-omega-(succinimidyl propionate) dodeca(ethylene glycol) CAS-NO: 1334169-95-7 FORMULA: $C_{33}H_{59}NO_{17}S$ MOLECULAR WEIGHT: 773,88 g/mole FURTHER INFORMATION: Spacer length 39 atoms or 46.8 A		PEG3630.0100 PEG3630.1000	100 mg 1 g	€ 515,00 € 1475,00
PEG3670 Ac-S-dPEG™(16)-COOH alpha-Acethylthio-omega-(propionic acid) hexadeca(ethylene glycol) CAS-NO: 956497-30-6 FORMULA: $C_{37}H_{72}O_{19}S$ MOLECULAR WEIGHT: 853,02 g/mole FURTHER INFORMATION: Spacer length 51 atoms or 61.0 A		please inquire!		
PEG3640 Ac-S-dPEG™(16)-NHS alpha-Acethylthio-omega-(succinimidyl propionate) hexadeca(ethylene glycol) CAS-NO: 1334169-95-7 FORMULA: $C_{41}H_{75}NO_{21}S$ MOLECULAR WEIGHT: 950,09 g/mole FURTHER INFORMATION: Spacer length 51 atoms or 61.0 A		please inquire!		
PEG3680 Ac-S-dPEG™(20)-COOH alpha-Acethylthio-omega-(propionic acid) 20(ethylene glycol) CAS-NO: 956497-30-6 FORMULA: $C_{45}H_{88}O_{23}S$ MOLECULAR WEIGHT: 1029,23 g/mole FURTHER INFORMATION: Spacer length 63 atoms or 75.5 A		please inquire!		

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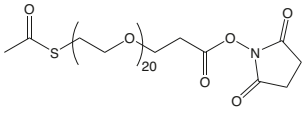
Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price

PEG3650 Ac-S-dPEG™(20)-NHS

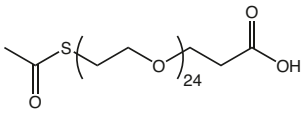
alpha-Acethylthio-omega-(succinimidyl propionate) 20(ethylene glycol)
CAS-NO: 1334169-95-7
FORMULA: $C_{49}H_{91}NO_{25}S$
MOLECULAR WEIGHT: 1126,3 g/mole



please inquire!

PEG5050 Ac-S-dPEG™(24)-COOH

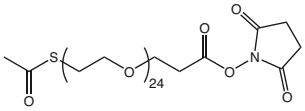
alpha-Acethylthio-omega-(propionic acid) 24(ethylene glycol)
FORMULA: $C_{53}H_{104}O_{27}S$
MOLECULAR WEIGHT: 1205,44 g/mole
FURTHER INFORMATION: Spacer length 76 atoms or 88.3 A



PEG5050.0100	100 mg	€	575,00
PEG5050.1000	1 g	€	1800,00

PEG5060 Ac-S-dPEG™(24)-NHS

alpha-Acethylthio-omega-(succinimidyl propionate) 24(ethylene glycol)
FORMULA: $C_{57}H_{107}NO_{29}S$
MOLECULAR WEIGHT: 1302,51 g/mole
FURTHER INFORMATION: Spacer length 76 atoms or 89.1 A



PEG5060.0100	100 mg	€	625,00
PEG5060.1000	1 g	€	1850,00

Bifunctional thiol-PEG-acids attach to Au and Ag surfaces and equip them with hydrophilic properties and carboxyl functionality, which can be used for further derivatization.

PEG-thiols are reactive with metal surfaces, other thiols, disulfides, maleimides, vinyl sulfones, and haloacetamides, incorporate water solubility, reduce or eliminate aggregation, and are inherently non-immunogenic and non-toxic.

They are useful PEGylating reagents for incorporating the sulfhydryl moiety into a peptide, potentially an alternative to cysteine in peptide sequences.

Thiol-PEG-acids are very soluble in methylene chloride and ethyl acetate.

Product handling and stability:

Keep product under an inert atmosphere (dry nitrogen or argon recommended) to prevent oxidation to the disulfide!

Deprotection conditions for trityl derivatives:

Trt (Trityl) is removed using 25-50% TFA with 5% TIS (triisopropyl silane).

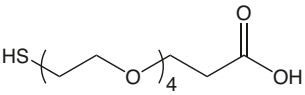
Mmt (4-Methoxy-trityl) can be removed with <5% TFA in the presence of TIS (triisopropyl silane).

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; ISBN 978-0-12-370501-3

PEG1970 HS-dPEG(4)-COOH

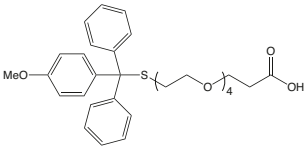
15-Mercapto-4,7,10,13-tertaoxa-pentadecanoic acid
CAS-NO: 749247-06-1
FORMULA: $C_{11}H_{22}O_6S$
MOLECULAR WEIGHT: 282,35 g/mole
FURTHER INFORMATION: Spacer length 16 atoms or 18.3 A



PEG1970.0100	100 mg	€	265,00
PEG1970.0001	1 g	€	575,00

PEG1740 Mmt-S-dPEG(4)-COOH

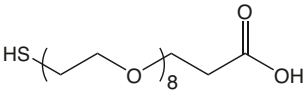
15-(4-Methoxytrityl)thio-4,7,10,13-tertaoxa-pentadecanoic acid
CAS-NO: 1263047-31-9
FORMULA: $C_{31}H_{38}O_7S$
MOLECULAR WEIGHT: 554,69 g/mole
FURTHER INFORMATION: Spacer length 16 atoms or 18.3 A



PEG1740.0100	100 mg	€	225,00
PEG1740.0001	1 g	€	625,00

PEG1120 HS-PEG(8)-COOH

alpha-Thio-omega-(propionic acid) octa(ethylene glycol)
CAS-NO: 866889-02-3
FORMULA: $C_{19}H_{38}O_{10}S$
MOLECULAR WEIGHT: 458,57 g/mole
FURTHER INFORMATION: Spacer length 28 atoms or 32.5 A

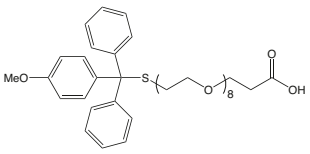


PEG1120.0001	1 g	€	420,00
PEG1120.0005	5 g	€	1450,00

Prices are in EUR, net, exw Germany

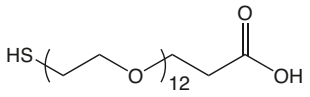
		Article No.	Quantity	Price
PEG1735	**Mmt-S-dPEG(8)-COOH**	PEG1735.0100	100 mg	€ 265,00
		PEG1735.0001	1 g	€ 1025,00

alpha-(4-Methoxytrityl)thio-octa(ethylene glycol)-omega-propionic acid
CAS-NO: 1334177-82-0
FORMULA: $C_{39}H_{54}O_{11}S$
MOLECULAR WEIGHT: 730,91 g/mole



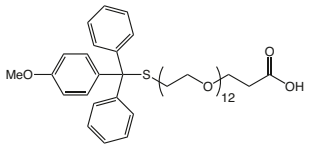
PEG3440	**HS-dPEG™(12)-COOH**	PEG3440.0100	100 mg	€ 325,00
		PEG3440.1000	1 g	€ 990,00

alpha-Thio-omega-(propionic acid) dodeca(ethylene glycol)
CAS-NO: 1032347-93-5
FORMULA: $C_{27}H_{54}O_{14}S$
MOLECULAR WEIGHT: 634,77 g/mole
FURTHER INFORMATION: Spacer length 39 atoms or 46.8 A



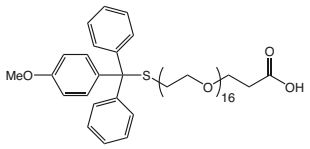
PEG4600	**Mmt-S-dPEG™(12)-COOH**	PEG4600.0100	100 mg	€ 325,00
		PEG4600.1000	1 g	€ 1200,00

alpha-(4-Methoxytrityl)thio-dodeca(ethylene glycol)-omega-propionic acid
CAS-NO: 1334169-94-6
FORMULA: $C_{47}H_{70}O_{15}S$
MOLECULAR WEIGHT: 907,11 g/mole
FURTHER INFORMATION: Spacer length 39 atoms or 46.8 A



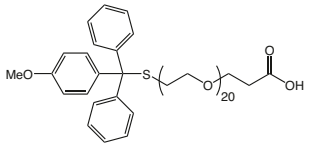
PEG4610	**Mmt-S-dPEG™(16)-COOH**	please inquire!		

alpha-(4-Methoxytrityl)thio-hexadeca(ethylene glycol)-omega-propionic acid
CAS-NO: 1334169-94-6
FORMULA: $C_{55}H_{86}O_{19}S$
MOLECULAR WEIGHT: 1083,32 g/mole
FURTHER INFORMATION: Spacer length 51 atoms or 61.0 A



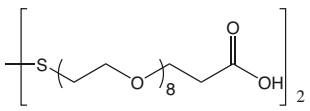
PEG4620	**Mmt-S-dPEG™(20)-COOH**	please inquire!		

alpha-(4-Methoxytrityl)thio-20(ethylene glycol)-omega-propionic acid
CAS-NO: 1334177-99-9
FORMULA: $C_{63}H_{102}O_{23}S$
MOLECULAR WEIGHT: 1259,54 g/mole
FURTHER INFORMATION: Spacer length 63 atoms or 75.5 A



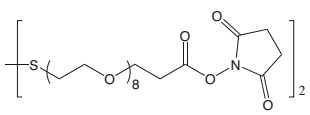
PEG1119	**HOOC-PEG(8)-SS-PEG(8)-COOH**	PEG1119.0001	1 g	€ 475,00
		PEG1119.0005	5 g	€ 1500,00

Propionic acid octa(ethylene glycol)-disulfid
CAS-NO: 873013-93-5
FORMULA: $C_{38}H_{74}O_{20}S_2$
MOLECULAR WEIGHT: 915,11 g/mole



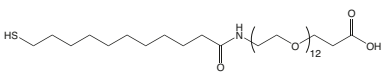
PEG1188	**NHS-PEG(8)-SS-PEG(8)-NHS**	PEG1188.0001	1 g	€ 550,00
		PEG1188.0005	5 g	€ 1775,00

N-Hydroxy-succinimidy-propionate octa(ethylene glycol)-disulfid
CAS-NO: 947601-98-1
FORMULA: $C_{46}H_{80}N_2O_{24}S_2$
MOLECULAR WEIGHT: 1109,26 g/mole



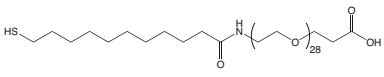
PEG2000	**HS-FA-PEG(12)-COOH**	PEG2000.0100	100 mg	€ 450,00

alpha-(11-Mercapto-undecanoylamido)-omega-carboxy dodeca(ethylene glycol)
FORMULA: $C_{38}H_{75}NO_{15}S$
MOLECULAR WEIGHT: 818,06 g/mole



PEG2005	**HS-FA-PEG(28)-COOH**	please inquire!		

alpha-(11-Mercapto-undecanoylamido)-omega-carboxy 28(ethylene glycol)
FORMULA: $C_{70}H_{139}NO_{31}S$
MOLECULAR WEIGHT: 1522,91 g/mole



Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price
PEG1099 HS-PEG-COOH alpha-Thio-omega-carboxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG1099.0500	500 mg	€ 325,00
	PEG1099.0001	1 g	€ 550,00
PEG1100 HS-PEG-COOH alpha-Thio-omega-carboxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG1100.0500	500 mg	€ 325,00
	PEG1100.0001	1 g	€ 550,00
PEG1098 HS-PEG-COOH alpha-Thio-omega-carboxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG1098.0500	500 mg	€ 350,00
	PEG1098.0001	1 g	€ 600,00
PEG1200 Trt-S-PEG-NHS alpha-Tritylthio-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG1200.0500	500 mg	€ 500,00
	PEG1200.0001	1 g	€ 900,00
PEG1201 Trt-S-PEG-NHS alpha-Tritylthio-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG1201.0500	500 mg	€ 500,00
	PEG1201.0001	1 g	€ 900,00
PEG1199 Trt-S-PEG-NHS alpha-Tritylthio-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG1199.0500	500 mg	€ 550,00
	PEG1199.0001	1 g	€ 950,00
PEG2225 OPSS-PEG(4)-COOH N-[3-(o-Pyridyldisulfido)propanoyl]-15-amino-4,7,10,13-tetraoxa-pentadecanoic acid CAS-NO: 581065-97-6 FORMULA: $C_{19}H_{30}N_2O_7S_2$ MOLECULAR WEIGHT: 462,58 g/mole FURTHER INFORMATION: Spacer length 20 atoms or 23.1 A	PEG2225.0100	100 mg	€ 295,00
	PEG2225.0001	1 g	€ 515,00
PEG2230 OPSS-PEG(4)-NHS N-[3-(o-Pyridyldisulfido)propanoyl]-15-amino-4,7,10,13-tetraoxa-pentadecanoyl succinimidyl ester CAS-NO: 1334177-95-5 FORMULA: $C_{23}H_{33}N_3O_9S_2$ MOLECULAR WEIGHT: 559,65 g/mole FURTHER INFORMATION: Spacer length 20 atoms or 23.1 A	PEG2230.0100	100 mg	€ 295,00
	PEG2230.0001	1 g	€ 1225,00
PEG2235 OPSS-PEG(8)-COOH alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-carboxy octa(ethylene glycol) CAS-NO: 1334177-96-6 FORMULA: $C_{27}H_{46}N_2O_{11}S_2$ MOLECULAR WEIGHT: 638,79 g/mole FURTHER INFORMATION: Spacer length 32 atoms or 37.2 A	PEG2235.0100	100 mg	€ 325,00
	PEG2235.0001	1 g	€ 695,00
PEG2240 OPSS-PEG(8)-NHS alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-succinimidyl ester octa(ethylene glycol) CAS-NO: 1252257-56-9 FORMULA: $C_{31}H_{49}N_3O_{13}S_2$ MOLECULAR WEIGHT: 735,86 g/mole FURTHER INFORMATION: Spacer length 32 atoms or 37.2 A	PEG2240.0100	100 mg	€ 325,00
	PEG2240.0001	1 g	€ 1375,00

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Article No.	Quantity	Price
PEG2245.0100	100 mg	€ 325,00
PEG2245.0001	1 g	€ 880,00

PEG2245 OPSS-PEG(12)-COOH

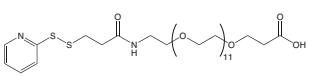
alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-carboxy dodeca(ethylene glycol)

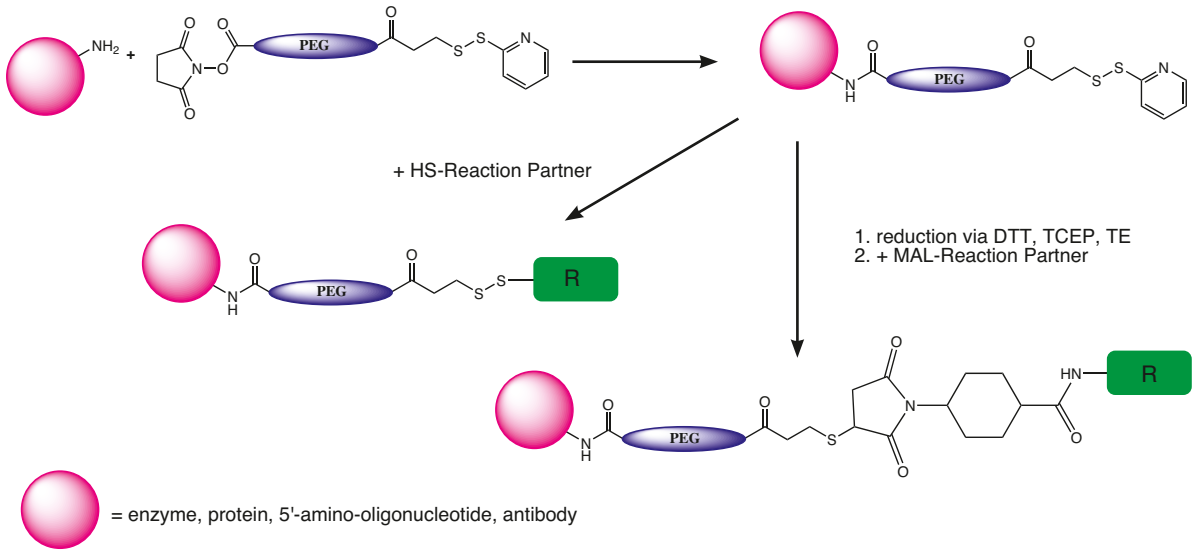
CAS-NO: 1334177-97-7

FORMULA: $C_{35}H_{62}N_2O_{15}S_2$

MOLECULAR WEIGHT: 815 g/mole

FURTHER INFORMATION: Spacer length 44 Atoms or 51.3 A





The general application of OPSS protected mercapto-PEG crosslinkers is the controlled and selective conjugation of an amine containing target, which reacts first with the NHS ester and then subsequently with a sulfhydryl containing complementary target molecule to form another disulfide. Many biological molecules contain both the amine function and the complementary compounds. Peptides, oligonucleotides or other biologicals, for example, can be terminated with thiols or have thiols designed into them, and vice versa. The contrast with the maleimide containing crosslinkers is that the OPSS derivatives form a disulfide, stable under non-reducing conditions. Normally, thiols can be cleaved with a reducing agent or exchanged with another thiol.

The OPSS group presents the potential of using the pyridine-2-thione, released in the reaction with another thiol, to measure the level of the PEG-OPSS incorporation in the labeling step or to monitor the subsequent reaction with another thiol by measuring its absorption at 343 nm.

The cleavable OPSS PEGylating reagents produce a disulfide bond with thiols, which can later be cleaved with a variety of reducing agents like DTT or TCEP, or react with another thiol.

References:

- Synthesis and Characterization of Insulin-Transferrin Conjugates; N. J. Kavimandan, E. Losi, J. J. Wilson, J. S. Brodbelt and N. A. Peppas; *Bioconjug Chem* 2006; **17**: 1376-1384. doi:10.1021/bc050344k
- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 276-335; ISBN 978-0-12-370501-3
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- Antibody Linking to Atomic Force Microscope Tips via Disulfide Bond Formation; A. S. M. Kamruzzahan, A. Ebner, L. Wildling, F. Kienberger, C. K. Riener, C. D. Hahn, P. D. Pollheimer, P. Winklehner, M. Hölzl, B. Lackner, D. M. Schörkl, P. Hinterdorfer and H. J. Gruber; *Bioconjug Chem* 2006; **17**: 1473-1481. doi:10.1021/bc060252a
- Quantitative Analysis of Derivatized Proteins Prepared with Pyridyl Disulfide-Containing Cross-Linkers by High-Performance Liquid Chromatography; D. H. Na, B. H. Woo and K. C. Lee; *Bioconjug Chem* 1999; **10**: 306-310. doi:10.1021/bc980029g
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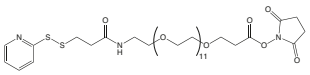
- Preparation of Thiol-Reactive Cy5 Derivatives from Commercial Cy5 Succinimidyl Ester†; H. J. Gruber, G. Kada, B. Pragl, C. Riener, C. D. Hahn, G. S. Harms, W. Ahrer, T. G. Dax, K. Hohenthanner and H.-G. Knaus; *Bioconjug Chem* 2000; **11**: 161-166. doi:10.1021/bc990107f
- Michael-Type Addition as a Tool for Surface Functionalization; M. Heggli, N. Tirelli, A. Zisch and J. A. Hubbell; *Bioconjug Chem* 2003; **14**: 967-973. doi:10.1021/bc0340621
- Covalent Protein-Oligonucleotide Conjugates for Efficient Delivery of Antisense Molecules; S. B. Rajur, C. M. Roth, J. R. Morgan and M. L. Yarmush; *Bioconjug Chem* 1997; **8**: 935-940. doi:10.1021/bc970172u
- Basic Studies on Heterobifunctional Biotin-PEG Conjugates with a 3-(4-Pyridyldithio)propionyl Marker on the Second Terminus; K. Kaiser, M. Marek, T. Haselgrübler, H. Schindler and H. J. Gruber; *Bioconjug Chem* 1997; **8**: 545-551. doi:10.1021/bc970086u

Prices are in EUR, net, exw Germany

	Article No.	Quantity	Price

PEG2250 OPSS-PEG(12)-NHS

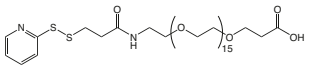
alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-succinimidyl ester dodeca(ethylene glycol)
CAS-NO: 924280-65-9
FORMULA: $C_{39}H_{65}N_3O_{17}S_2$
MOLECULAR WEIGHT: 912,07 g/mole
FURTHER INFORMATION: Spacer length 44 atoms or 51.3 A



PEG2250.0100	100 mg	€	325,00
PEG2250.0001	1 g	€	1375,00

PEG3930 OPSS-dPEG™(16)-COOH

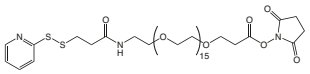
alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-(propionic acid) hexadeca(ethylene glycol)
CAS-NO: 1334177-97-7
FORMULA: $C_{43}H_{78}N_2O_{19}S_2$
MOLECULAR WEIGHT: 991,21 g/mole
FURTHER INFORMATION: Spacer length 59 atoms or 63.7 A



please inquire!

PEG3900 OPSS-dPEG™(16)-NHS

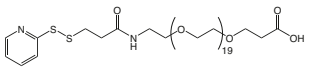
alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-(succinimidyl propionate) hexadeca(ethylene glycol)
CAS-NO: 924280-65-9
FORMULA: $C_{47}H_{81}N_3O_{21}S_2$
MOLECULAR WEIGHT: 1088,28 g/mole
FURTHER INFORMATION: Spacer length 59 atoms or 63.7 A



please inquire!

PEG3940 OPSS-dPEG™(20)-COOH

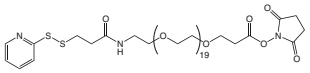
alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-(propionic acid) 20(ethylene glycol)
CAS-NO: 1334177-97-7
FORMULA: $C_{51}H_{94}N_2O_{23}S_2$
MOLECULAR WEIGHT: 1167,42 g/mole
FURTHER INFORMATION: Spacer length 68 atoms or 79.4 A



please inquire!

PEG3910 OPSS-dPEG™(20)-NHS

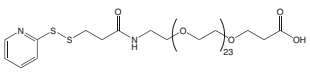
alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-(succinimidyl propionate) 20(ethylene glycol)
CAS-NO: 924280-65-9
FORMULA: $C_{55}H_{97}N_3O_{25}S_2$
MOLECULAR WEIGHT: 1264,49 g/mole
FURTHER INFORMATION: Spacer length 68 atoms or 79.4 A



please inquire!

PEG2255 OPSS-PEG(24)-COOH

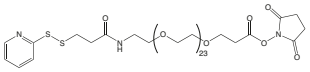
alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-carboxy 24(ethylene glycol)
CAS-NO: 1334177-97-7
FORMULA: $C_{59}H_{110}N_2O_{27}S_2$
MOLECULAR WEIGHT: 1343,63 g/mole
FURTHER INFORMATION: Spacer length 80 atoms or 93.7 A



PEG2255.0100	100 mg	€	355,00
PEG2255.0001	1 g	€	1200,00

PEG2260 OPSS-PEG(24)-NHS

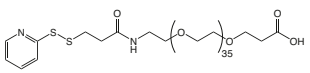
alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-succinimidyl ester 24(ethylene glycol)
CAS-NO: 924280-65-9
FORMULA: $C_{63}H_{113}N_3O_{29}S_2$
MOLECULAR WEIGHT: 1440,7 g/mole
FURTHER INFORMATION: Spacer length 80 atoms or 97.3 A



PEG2260.0100	100 mg	€	355,00
PEG2260.0001	1 g	€	1525,00

PEG3950 OPSS-dPEG™(36)-COOH

alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-(propionic acid) 36(ethylene glycol)
CAS-NO: 1334177-97-7
FORMULA: $C_{83}H_{158}N_2O_{39}S_2$
MOLECULAR WEIGHT: 1872,26 g/mole
FURTHER INFORMATION: Spacer length 137.8 atoms or 115 A



PEG3950.0100	100 mg	€	385,00
PEG3950.1000	1 g	€	1650,00

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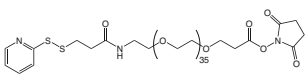
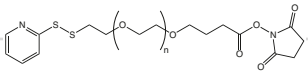
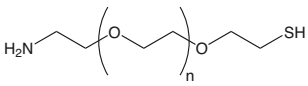
		Article No.	Quantity	Price
PEG3920 OPSS-dPEG™(36)-NHS alpha-[3-(o-Pyridyldisulfido)propanoylamido]-omega-(succinimidyl propionate) 36(ethylene glycol) CAS-NO: 924280-65-9 FORMULA: $C_{87}H_{161}N_3O_{41}S_2$ MOLECULAR WEIGHT: 1969,33 g/mole FURTHER INFORMATION: Spacer length 115 atoms or 137.8 A		PEG3920.0100 PEG3920.1000	100 mg 1 g	€ 385,00 € 1650,00
PEG1216 OPSS-PEG-NHS alpha-Pyridyl-2-disulfid-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1216.0500 PEG1216.0001	500 mg 1 g	€ 510,00 € 925,00
PEG1217 OPSS-PEG-NHS alpha-Pyridyl-2-disulfid-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1217.0500 PEG1217.1000	500 mg 1 g	€ 510,00 € 925,00
PEG1215 OPSS-PEG-NHS alpha-Pyridyl-2-disulfid-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1215.0500 PEG1215.1000	500 mg 1 g	€ 510,00 € 925,00
PEG4720 OPSS-PEG-NHS alpha-Pyridyl-2-disulfid-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG4720.0500 PEG4720.1000	500 mg 1 g	€ 510,00 € 925,00

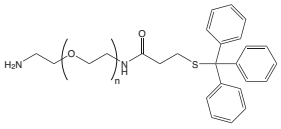
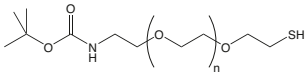
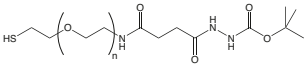
3.7.3 Amino- and Hydrazido-PEG-Thiols

		Article No.	Quantity	Price
PEG1197 H_2N-PEG-SH*HCl alpha-Amino-omega-mercapto poly(ethylene glycol) hydrochloride (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1197.0500 PEG1197.0001	500 mg 1 g	€ 325,00 € 575,00
PEG1198 H_2N-PEG-SH*HCl alpha-Amino-omega-mercapto poly(ethylene glycol) hydrochloride (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1198.0500 PEG1198.0001	500 mg 1 g	€ 325,00 € 575,00
PEG1196 H_2N-PEG-SH*HCl alpha-Amino-omega-mercapto poly(ethylene glycol) hydrochloride (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1196.0500 PEG1196.0001	500 mg 1 g	€ 360,00 € 630,00

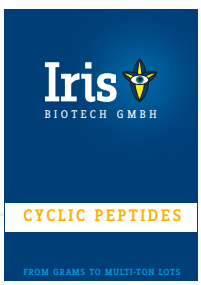
Bulk quantities of thiol reducing agent DTT are under continuous production.

Ton lot quantities are available within short delivery time.

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG1027 H_2N-PEG-STrt alpha-Amino-omega-tritylthio poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1027.0500	500 mg	€ 500,00
		PEG1027.0001	1 g	€ 900,00
PEG1028 H_2N-PEG-STrt alpha-Amino-omega-tritylthio poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1028.0500	500 mg	€ 500,00
		PEG1028.0001	1 g	€ 900,00
PEG1026 H_2N-PEG-STrt alpha-Amino-omega-tritylthio poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1026.0500	500 mg	€ 550,00
		PEG1026.0001	1 g	€ 950,00
PEG1114 Boc-NH-PEG-SH alpha-t-Butyloxycarbonylamino-omega-mercapto poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1114.0500	500 mg	€ 275,00
		PEG1114.0001	1 g	€ 450,00
PEG1115 Boc-NH-PEG-SH alpha-t-Butyloxycarbonylamino-omega-mercapto poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1115.0500	500 mg	€ 275,00
		PEG1115.0001	1 g	€ 450,00
PEG1113 Boc-NH-PEG-SH alpha-t-Butyloxycarbonylamino-omega-mercapto poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1113.0500	500 mg	€ 280,00
		PEG1113.0001	1 g	€ 500,00
PEG1102 HS-PEG-CONH-NH-Boc alpha-Thio-omega-t-butyloxycarbonyl-hydrazido poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1102.0500	500 mg	€ 590,00
		PEG1102.0001	1 g	€ 1050,00
PEG1103 HS-PEG-CONH-NH-Boc alpha-Thio-omega-t-butyloxycarbonyl-hydrazido poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1103.0500	500 mg	€ 590,00
		PEG1103.0001	1 g	€ 1050,00
PEG1101 HS-PEG-CONH-NH-Boc alpha-Thio-omega-t-butyloxycarbonyl-hydrazido poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1101.0500	500 mg	€ 625,00
		PEG1101.0001	1 g	€ 1100,00

Disulfide bridges are an important structural element in many proteins and peptides. This brochure is a guideline how to plan and execute the Synthesis of **Cyclic Peptides** with one or several disulfide bridges.

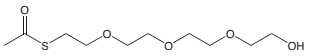
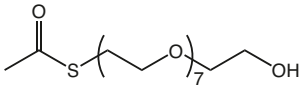
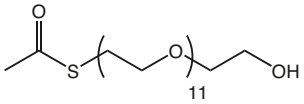
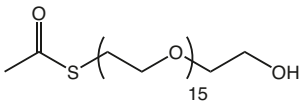
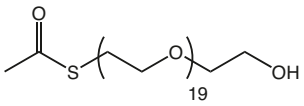
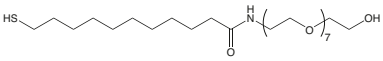
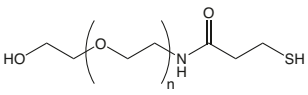


Prices are in EUR, net, exw Germany

3.7.4 Hydroxy-PEG-Thiols

Mercapto-PEG derivatives react with thiol reactive agents e.g. maleimides, vinyl sulfones or α-halo keto functionalized reaction partners.

They are highly hydrophilic, non-antigenic, non-immunogenic and non-toxic.

		Article No.	Quantity	Price
PEG2095 Ac-S-TEG-OH S-Acetyl-mercapto-tetra(ethylene glycol) CAS-NO: 223611-42-5 FORMULA: $C_{10}H_{20}O_5S$ MOLECULAR WEIGHT: 252,33 g/mole FURTHER INFORMATION: Spacer length 13 atoms or 14.6 A		PEG2095.0100 PEG2095.0001	100 mg 1 g	€ 175,00 € 575,00
PEG2470 Ac-S-OEG-OH S-Acetyl-mercapto-octa(ethylene glycol) CAS-NO: 223611-42-5 FORMULA: $C_{18}H_{36}O_9S$ MOLECULAR WEIGHT: 428,54 g/mole FURTHER INFORMATION: Spacer length 25 atoms or 28.8 A		PEG2470.0100 PEG2470.0001	100 mg 1 g	€ 225,00 € 750,00
PEG3790 Ac-S-dPEG™(12)-OH alpha-Acethylthio-omega-hydroxy dodeca(ethylene glycol) CAS-NO: 165729-83-9 FORMULA: $C_{26}H_{52}O_{13}S$ MOLECULAR WEIGHT: 604,75 g/mole FURTHER INFORMATION: Spacer length 36 atoms or 43.1 A		PEG3790.0100 PEG3790.1000	100 mg 1 g	€ 265,00 € 925,00
PEG3800 Ac-S-dPEG™(16)-OH alpha-Acethylthio-omega-hydroxy hexadeca(ethylene glycol) CAS-NO: 165729-83-9 FORMULA: $C_{34}H_{68}O_{17}S$ MOLECULAR WEIGHT: 780,96 g/mole FURTHER INFORMATION: Spacer length 47 atoms or 57.3 A		please inquire!		
PEG3810 Ac-S-dPEG™(20)-OH alpha-Acethylthio-omega-hydroxy 20(ethylene glycol) CAS-NO: 165729-83-9 FORMULA: $C_{42}H_{84}O_{21}S$ MOLECULAR WEIGHT: 957,17 g/mole FURTHER INFORMATION: Spacer length 59 atoms or 71.8 A		please inquire!		
PEG2010 HS-FA-PEG(8)-OH alpha-(11-Mercapto-undecanoylamido)-omega-hydroxy octa(ethylene glycol) FORMULA: $C_{27}H_{55}NO_9S$ MOLECULAR WEIGHT: 569,79 g/mole		PEG2010.0100	100 mg	€ 375,00
PEG1018 HO-PEG-SH alpha-Hydroxy-omega-mercapto poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1018.0500 PEG1018.0001	500 mg 1 g	€ 375,00 € 600,00
PEG1019 HO-PEG-SH alpha-Hydroxy-omega-mercapto poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1019.0500 PEG1019.0001	500 mg 1 g	€ 375,00 € 600,00
PEG1017 HO-PEG-SH alpha-Hydroxy-omega-mercapto poly(ethylene glycol)(PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1017.0500 PEG1017.0001	500 mg 1 g	€ 400,00 € 650,00

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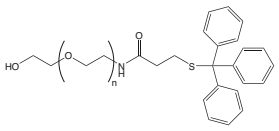
		Article No.	Quantity	Price
PEG1024 **HO-PEG-STrt** alpha-Hydroxy-omega-tritylthio poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1024.0500 PEG1024.0001	500 mg 1 g	€ 140,00 € 240,00
PEG1025 **HO-PEG-STrt** alpha-Hydroxy-omega-tritylthio poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1025.0500 PEG1025.0001	500 mg 1 g	€ 140,00 € 240,00
PEG1023 **HO-PEG-STrt** alpha-Hydroxy-omega-tritylthio poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1023.0500 PEG1023.0001	500 mg 1 g	€ 175,00 € 300,00

3.7.5 Methoxy-PEG-Thiols

Methoxy-PEG-thiols are reactive with metal surfaces, other thiols, disulfides, maleimides, vinyl sulfones, and haloacetamides and incorporate properties as hydrophilicity and non-immunogenicity.

These PEG products are highly soluble in water, methylene chloride and ethyl acetate, as well as other common organic solvents but insoluble in methyl tertbutyl ether or hexanes.

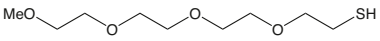
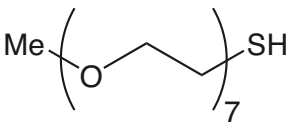
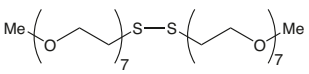
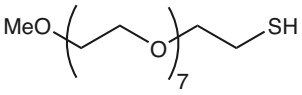
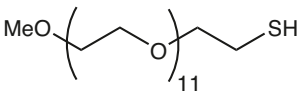
They are ideal hydrophilic capping agent for gold and silver surfaces.

Product handling and stability:

Keep product under an inert atmosphere (dry nitrogen or argon recommended) to prevent oxidation to the disulfide! If oxidized to the disulfide, product can be reduced in water or aqueous buffer using TCEP.

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; ISBN 978-0-12-370501-3

		Article No.	Quantity	Price
PEG3470 **MeO-dPEG™(4)-SH** alpha-Methoxy-omega-mercapto tetra(ethylene glycol) CAS-NO: 52190-55-3 FORMULA: $C_9H_{20}O_4S$ MOLECULAR WEIGHT: 224,32 g/mole FURTHER INFORMATION: Spacer length 14 atoms or 15.8 A		PEG3470.0100 PEG3470.1000	100 mg 1 g	€ 225,00 € 515,00
PEG1167 **MeO-PEG(7)-SH** alpha-Methoxy-omega-mercapto hepta(ethylene glycol) FORMULA: $C_{15}H_{32}O_7S$ MOLECULAR WEIGHT: 356,48 g/mole		PEG1167.0001 PEG1167.0005	1 g 5 g	€ 350,00 € 1100,00
PEG1195 **MeO-PEG(7)-SS-PEG(7)-OMe** Methoxy-hepta(ethylen glycol)-disulfid FORMULA: $C_{30}H_{62}O_{14}S_2$ MOLECULAR WEIGHT: 710,93 g/mole		PEG1195.0001 PEG1195.0005	1 g 5 g	€ 300,00 € 1050,00
PEG3480 **MeO-dPEG™(8)-SH** alpha-Methoxy-omega-mercapto octa(ethylene glycol) CAS-NO: 651042-83-0 FORMULA: $C_{17}H_{36}O_8S$ MOLECULAR WEIGHT: 400,53 g/mole FURTHER INFORMATION: Spacer length 26 atoms or 30.0 A		PEG3480.0100 PEG3480.1000	100 mg 1 g	€ 265,00 € 675,00
PEG3490 **MeO-dPEG™(12)-SH** alpha-Methoxy-omega-mercapto dodeca(ethylene glycol) CAS-NO: 134874-49-0 FORMULA: $C_{25}H_{52}O_{12}S$ MOLECULAR WEIGHT: 576,74 g/mole FURTHER INFORMATION: Spacer length 38 atoms or 44.2 A		PEG3490.0100 PEG3490.1000	100 mg 1 g	€ 325,00 € 1025,00

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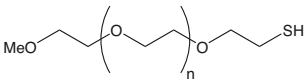
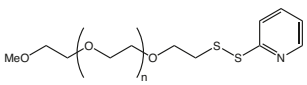
		Article No.	Quantity	Price
PEG1172 **MeO-PEG-SH** alpha-Methoxy-omega-mercapto poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 Da		PEG1172.0001	1 g	€ 310,00
		PEG1172.0005	5 g	€ 900,00
PEG1169 **MeO-PEG-SH** alpha-Methoxy-omega-mercapto poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1169.0001	1 g	€ 275,00
		PEG1169.0005	5 g	€ 750,00
PEG1171 **MeO-PEG-SH** alpha-Methoxy-omega-mercapto poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1171.0001	1 g	€ 275,00
		PEG1171.0005	5 g	€ 750,00
PEG1168 **MeO-PEG-SH** alpha-Methoxy-omega-mercapto poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1168.0001	1 g	€ 275,00
		PEG1168.0005	5 g	€ 750,00
PEG1170 **MeO-PEG-SH** alpha-Methoxy-omega-mercapto poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1170.0001	1 g	€ 275,00
		PEG1170.0005	5 g	€ 750,00
PEG4745 **MeO-PEG-OPSS** alpha-Methoxy-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 Da		PEG4745.0500	500 mg	€ 425,00
		PEG4745.1000	1 g	€ 1275,00
PEG4750 **MeO-PEG-OPSS** alpha-Methoxy-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 2000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG4750.0500	500 mg	€ 350,00
		PEG4750.1000	1 g	€ 1075,00
PEG4755 **MeO-PEG-OPSS** alpha-Methoxy-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG4755.0500	500 mg	€ 350,00
		PEG4755.1000	1 g	€ 1075,00
PEG4760 **MeO-PEG-OPSS** alpha-Methoxy-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG4760.0500	500 mg	€ 350,00
		PEG4760.1000	1 g	€ 1075,00
PEG4765 **MeO-PEG-OPSS** alpha-Methoxy-omega-pyridyl-2-disulfid poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG4765.0500	500 mg	€ 350,00
		PEG4765.1000	1 g	€ 1075,00

References see page 116

Need GMP production of PEGs? Please inquire!

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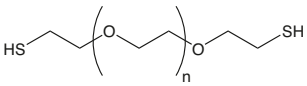
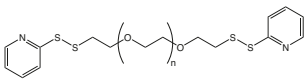
3.7.6 Bis-Mercapto-PEGs

		Article No.	Quantity	Price
PEG1122 **HS-PEG-SH** alpha,omega-Bis-mercapto poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1122.0001	1 g	€ 275,00
		PEG1122.0005	5 g	€ 750,00
PEG1124 **HS-PEG-SH** alpha,omega-Bis-mercapto poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1124.0001	1 g	€ 275,00
		PEG1124.0005	5 g	€ 750,00
PEG1125 **HS-PEG-SH** alpha,omega-Bis-mercapto poly(ethylene glycol) (PEG-MW 6.000 Dalton) MOLECULAR WEIGHT: 6000 Da		PEG1125.0001	1 g	€ 275,00
		PEG1125.0005	5 g	€ 750,00
PEG1121 **HS-PEG-SH** alpha,omega-Bis-mercapto poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1121.0001	1 g	€ 275,00
		PEG1121.0005	5 g	€ 750,00
PEG1123 **HS-PEG-SH** alpha,omega-Bis-mercapto poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1123.0001	1 g	€ 275,00
		PEG1123.0005	5 g	€ 750,00
PEG4715 **OPSS-PEG-OPSS** alpha,omega-Bis(pyridyl-2-disulfid) poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG4715.0500	500 mg	€ 350,00
		PEG4715.1000	1 g	€ 1075,00
PEG4725 **OPSS-PEG-OPSS** alpha,omega-Bis(pyridyl-2-disulfid) poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG4725.0500	500 mg	€ 350,00
		PEG4725.1000	1 g	€ 1075,00
PEG4730 **OPSS-PEG-OPSS** alpha,omega-Bis(pyridyl-2-disulfid) poly(ethylene glycol) (PEG-MW 6.000 Dalton) MOLECULAR WEIGHT: 6000 Da		PEG4730.0500	500 mg	€ 350,00
		PEG4730.1000	1 g	€ 1075,00
PEG4735 **OPSS-PEG-OPSS** alpha,omega-Bis(pyridyl-2-disulfid) poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG4735.0500	500 mg	€ 350,00
		PEG4735.1000	1 g	€ 1075,00
PEG4740 **OPSS-PEG-OPSS** alpha,omega-Bis(pyridyl-2-disulfid) poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG4740.0500	500 mg	€ 350,00
		PEG4740.1000	1 g	€ 1075,00

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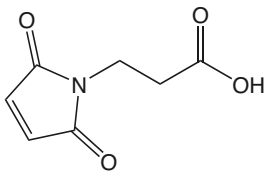
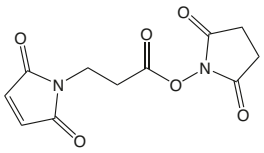
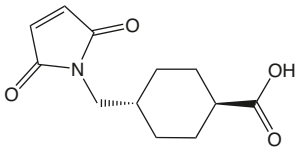
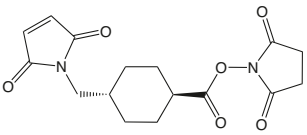
Prices are in EUR, net, exw Germany

3.8 PEG-Maleimides

3.8.1 Non-PEG Maleimido-Acid-Crosslinkers

		Article No.	Quantity	Price
PEG2135 mal-COOH 3-(Maleimido-1-yl)propanoic acid CAS-NO: 7423-55-4 FORMULA: $C_7H_7NO_4$ MOLECULAR WEIGHT: 169,13 g/mole FURTHER INFORMATION: Spacer length 6 atoms or 6.0 A		PEG2135.0100 PEG2135.0001	100 mg 1 g	€ 175,00 € 455,00
MAA1020 Mal-beta-Ala-OSu 3-(Maleimido)propionic acid N-succinimidyl ester CAS-NO: 55750-62-4 FORMULA: $C_{11}H_{10}N_2O_6$ MOLECULAR WEIGHT: 266,21 g/mole		MAA1020.0001 MAA1020.0005	1 g 5 g	€ 250,00 € 475,00
MAA5400 Mal-AMCHC-OH trans-4-(maleimidomethyl)cyclohexane-1-carboxylic acid CAS-NO: 69907-67-1 FORMULA: $C_{12}H_{15}NO_4$ MOLECULAR WEIGHT: 237,25 g/mole		MAA5400.0001 MAA5400.0005 MAA5400.0025	1 g 5 g 25 g	€ 100,00 € 400,00 € 1600,00
MAA1000 Mal-AMCHC-OSu trans-N-Succinimidyl 4-(maleimidomethyl)cyclohexane-1-carboxylate CAS-NO: 64987-85-5 FORMULA: $C_{16}H_{18}N_2O_6$ MOLECULAR WEIGHT: 334,33 g/mole		MAA1000.0001 MAA1000.0005	1 g 5 g	€ 180,00 € 720,00

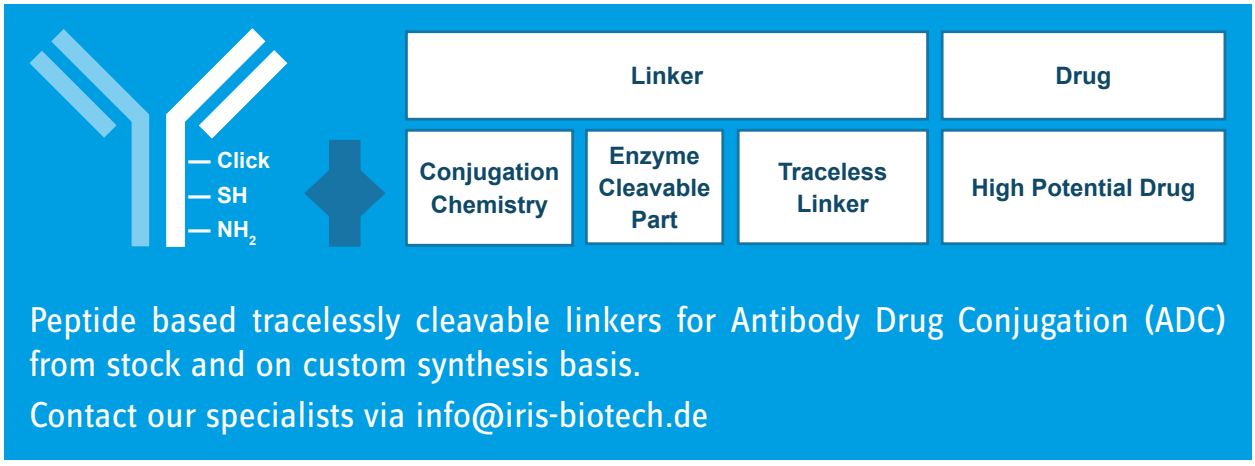
Application:

MAA100 and MAA1020 are heterobifunctional cross-linking reagents with amine and thiol reactivity. They are useful for the preparation of enzyme immune conjugates and hapten carrier molecule conjugates.

In the case of MAA1000, an extended spacer stabilizes the maleimide prior to coupling compared to aromatic spacers.

1. These reagents couple to molecules containing primary amine by amide bond formation in buffered solution at pH 7.5 (6.5-8.5).
2. The second coupling to thiol containing molecules by forming thioether linkage is carried out at pH 6.8 (6.5-7.0).

Antibody Drug Conjugation



Peptide based tracelessly cleavable linkers for Antibody Drug Conjugation (ADC) from stock and on custom synthesis basis.

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Prices are in EUR, net, exw Germany

3.8.2 Maleimido-PEG-Acids

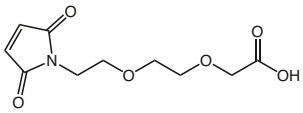
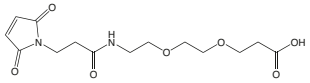
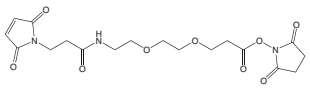
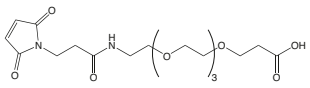
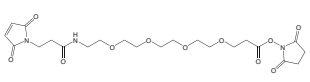
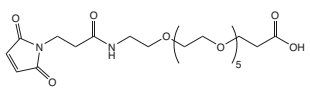
The general application of this class of heterobifunctional PEG crosslinkers is the controlled and selective conjugation of an amine containing target, which reacts first with the NHS ester and then subsequently with a sulfhydryl containing complementary target molecule. Many biological molecules contain both the amine function and the complementary compounds. Peptides, oligonucleotides or other biologicals, for example, can be terminated with thiols or have thiols designed into them, and vice versa.

These products are designed to activate carrier proteins for conjugating hapten (e.g. peptide) to a carrier (e.g. KLH, BSA, OVA, etc.) in order to reduce or eliminate the antigenicity and specificity issues with conventional activating crosslinkers which are reflected in the properties of the resulting antibodies. Much higher functional loadings can be achieved due to the increased water solubility imparted by the PEGylating reagent to the carrier–hapten conjugate, with decreased immunogenicity towards crosslinker and carrier.

Recommended solvents are DMAC, DMF or DMSO to ensure complete solubilization and homogeneity of the crosslinker in the buffer system. If water or buffer is preferred, the stabilities of both NHS ester and maleimide need to be considered.

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 276-335 and 718-722: protocols; 788: hapten-carrier conjugation; 871: liposome conjugation; 883: antibody liposome conjugation; ISBN 978-0-12-370501-3

		Article No.	Quantity		Price
PEG4870 **Mal-O2Oc-OH**		PEG4870.0250	250 mg	€	100,00
{2-[2-(2,5-Dioxo-2,5-dihydro-1H-pyrrol-1-yl)ethoxy]ethoxy}acetic acid CAS-NO: 173323-23-4 FORMULA: $C_{10}H_{13}NO_6$ MOLECULAR WEIGHT: 243,21 g/mole		PEG4870.0001	1 g	€	300,00
		PEG4870.0005	5 g	€	1200,00
PEG1555 **mal-PEG(2)-COOH**		PEG1555.0100	100 mg	€	160,00
3-(2-(2-(3-Maleimidopropanamido)ethoxy)ethoxy)propanoic acid CAS-NO: 756525-98-1 FORMULA: $C_{14}H_{20}N_2O_7$ MOLECULAR WEIGHT: 328,32 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 17.5 A		PEG1555.0001	1 g	€	175,00
PEG1560 **mal-PEG(2)-NHS**		PEG1560.0100	100 mg	€	225,00
3-(2-(2-(3-Maleimidopropanamido)ethoxy)ethoxy)propanoic acid succinimidyl ester CAS-NO: 955094-26-5 FORMULA: $C_{18}H_{23}N_3O_9$ MOLECULAR WEIGHT: 425,39 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 17.7 A		PEG1560.0001	1 g	€	325,00
PEG1570 **mal-dPEG(4)-COOH**		PEG1570.0100	100 mg	€	175,00
1-Maleimido-3-oxo-7,10,13,16-tetraoxa-4-azanonadecan-19-oic acid CAS-NO: 1263045-16-4 FORMULA: $C_{18}H_{28}N_2O_9$ MOLECULAR WEIGHT: 416,42 g/mole FURTHER INFORMATION: Spacer length 16 atoms or 17.5 A		PEG1570.0001	1 g	€	200,00
PEG1575 **mal-dPEG(4)-NHS**		PEG1575.0100	100 mg	€	265,00
15-[(3-Maleimid-1-yl)propanoylamido]-4,7,10,13-tetraoxa-pentadeca-noyl succinimidyl ester CAS-NO: 756525-99-2 FORMULA: $C_{22}H_{31}N_3O_{11}$ MOLECULAR WEIGHT: 513,5 g/mole FURTHER INFORMATION: Spacer length 22 atoms or 24.8 A		PEG1575.0001	1 g	€	385,00
PEG3850 **mal-dPEG™(6)-COOH**		PEG3850.0100	100 mg	€	200,00
alpha-Maleimido-hexa(ethylene glycol)-omega-propionic acid CAS-NO: 1334177-79-5 FORMULA: $C_{22}H_{36}N_2O_{11}$ MOLECULAR WEIGHT: 504,53 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 31.9 A		PEG3850.1000	1 g	€	225,00

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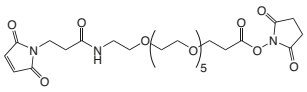
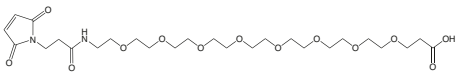
		Article No.	Quantity	Price
PEG1585	**mal-dPEG(6)-NHS**	PEG1585.0100	100 mg	€ 275,00
		PEG1585.0001	1 g	€ 450,00

25-Maleimido-23-oxo-4,7,10,13,16,19-hexaoxa-22-azapentacosanoic acid succinimidyl ester
CAS-NO: 1137109-21-7
FORMULA: $C_{26}H_{39}N_3O_{13}$
MOLECULAR WEIGHT: 601,6 g/mole
FURTHER INFORMATION: Spacer length 28 atoms or 31.7 A



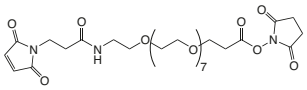
PEG1615	**mal-dPEG(8)-COOH**	PEG1615.0100	100 mg	€ 295,00
		PEG1615.0001	1 g	€ 355,00

1-Maleimido-3-oxo-7,10,13,16,19,22,25,28-octaoxa-4-azahentriacontan-31-oic acid
CAS-NO: 1334177-86-4
FORMULA: $C_{26}H_{44}N_2O_{13}$
MOLECULAR WEIGHT: 592,63 g/mole
FURTHER INFORMATION: Spacer length 34 atoms or 38.8 A



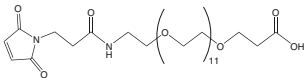
PEG1590	**mal-dPEG(8)-NHS**	PEG1590.0100	100 mg	€ 295,00
		PEG1590.0001	1 g	€ 575,00

1-Maleimido-3-oxo-7,10,13,16,19,22,25,28-octaoxa-4-azahentriacontan-31-oic acid succinimidyl ester
CAS-NO: 756525-93-6
FORMULA: $C_{30}H_{47}N_3O_{15}$
MOLECULAR WEIGHT: 689,71 g/mole
FURTHER INFORMATION: Spacer length 34 atoms or 39.2 A



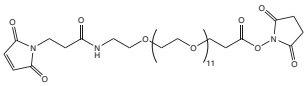
PEG2125	**mal-PEG(12)-COOH**	PEG2125.0100	100 mg	€ 295,00
		PEG2125.0001	1 g	€ 385,00

3-(2-(2-(3-(Maleimido-1-yl)propanamido)ethoxy)ethoxy)propanoic acid
CAS-NO: 871133-36-7
FORMULA: $C_{34}H_{60}N_2O_{17}$
MOLECULAR WEIGHT: 768,84 g/mole
FURTHER INFORMATION: Spacer length 46 atoms or 53.3 A



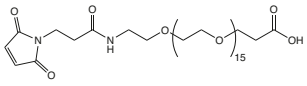
PEG1550	**mal-dPEG(12)-NHS**	PEG1550.0100	100 mg	€ 295,00
		PEG1550.0001	1 g	€ 850,00

1-Maleimido-3-oxo-7,10,13,16,19,22,25,28,31,34,37,40-dodecaoxa-4-azatritetracontan-43-oic acid succinimidyl ester
CAS-NO: 756525-92-5
FORMULA: $C_{38}H_{63}N_3O_{19}$
MOLECULAR WEIGHT: 865,92 g/mole
FURTHER INFORMATION: Spacer length 46 atoms or 53.3 A



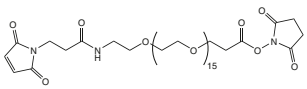
PEG3860	**mal-dPEG™(16)-COOH**	please inquire!	

alpha-Maleimido-hexadeca(ethylene glycol)-omega-propionic acid
CAS-NO: 871133-36-7
FORMULA: $C_{42}H_{76}N_2O_{21}$
MOLECULAR WEIGHT: 945,05 g/mole
FURTHER INFORMATION: Spacer length 57 atoms or 65.3 A



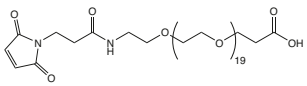
PEG3830	**mal-dPEG™(16)-NHS**	please inquire!	

alpha-Maleimido-omega-(succinimidyl propionate) hexadeca(ethylene glycol)
CAS-NO: 756525-92-5
FORMULA: $C_{46}H_{79}N_3O_{23}$
MOLECULAR WEIGHT: 1042,13 g/mole
FURTHER INFORMATION: Spacer length 57 atoms or 65.3 A

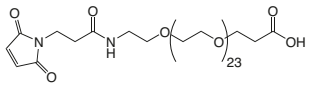
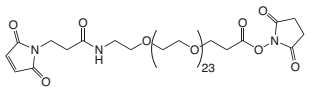
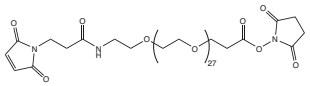
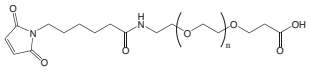
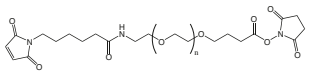


PEG3870	**mal-dPEG™(20)-COOH**	please inquire!	

alpha-Maleimido-20(ethylene glycol)-omega-propionic acid
CAS-NO: 871133-36-7
FORMULA: $C_{50}H_{92}N_2O_{25}$
MOLECULAR WEIGHT: 1121,26 g/mole
FURTHER INFORMATION: Spacer length 70 atoms or 82.0 A



Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG1600 **mal-dPEG(24)-COOH**		PEG1600.0100	100 mg	€ 295,00
alpha-Maleimido-24(ethylene glycol)-omega-propionic acid CAS-NO: 871133-36-7 FORMULA: $C_{58}H_{108}N_2O_{29}$ MOLECULAR WEIGHT: 1297,47 g/mole FURTHER INFORMATION: Spacer length 82 atoms or 95.2 A		PEG1600.0001	1 g	€ 1250,00
PEG1565 **mal-dPEG(24)-NHS**		PEG1565.0100	100 mg	€ 325,00
alpha-Maleimido-24(ethylene glycol)-omega-propionic acid succinimidyl ester CAS-NO: 756525-92-5 FORMULA: $C_{62}H_{111}N_3O_{31}$ MOLECULAR WEIGHT: 1394,55 g/mole FURTHER INFORMATION: Spacer length 82 atoms or 95.2 A		PEG1565.0001	1 g	€ 1425,00
PEG1209 **mal-PEG(27)-NHS**		PEG1209.0100	100 mg	€ 450,00
alpha-Maleimido-omega-carboxy succinimidyl ester 27(ethylene glycol) FORMULA: $C_{70}H_{127}N_3O_{35}$ MOLECULAR WEIGHT: 1570,76 g/mole		PEG1209.0001	1 g	€ 1500,00
PEG1059 **mal-PEG-COOH**		PEG1059.0500	500 mg	€ 475,00
alpha-Maleimido-omega-carboxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1059.0001	1 g	€ 800,00
PEG1060 **mal-PEG-COOH**		PEG1060.0500	500 mg	€ 475,00
alpha-Maleimido-omega-carboxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1060.0001	1 g	€ 800,00
PEG1058 **mal-PEG-COOH**		PEG1058.0500	500 mg	€ 500,00
alpha-Maleimido-omega-carboxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1058.0001	1 g	€ 850,00
PEG1062 **mal-PEG-NHS**		PEG1062.0500	500 mg	€ 500,00
alpha-Maleimido-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1062.0001	1 g	€ 875,00
		PEG1062.0005	5 g	€ 3500,00
PEG1063 **mal-PEG-NHS**		PEG1063.0500	500 mg	€ 500,00
alpha-Maleimido-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1063.0001	1 g	€ 875,00
PEG1061 **mal-PEG-NHS**		PEG1061.0500	500 mg	€ 525,00
alpha-Maleimido-omega-carboxy succinimidyl ester poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1061.0001	1 g	€ 950,00

Find in our brochure **Diagnostic Tools** tricks to improve the performance of your antibody based assays with the help of PEGs.

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3.8.3 Maleimido-PEG-Amines and Hydrazides

The general application of this class of heterobifunctional PEG crosslinkers is the controlled and selective conjugation of a carbonyl containing target, which reacts first with an aldehyde or ketone and then subsequently with a sulfhydryl containing complementary target molecule (such as a protein, peptide or modified oligonucleotide) which reacts with the maleimide.

The PEG containing heterobifunctional crosslinker incorporates hydrophilicity, water solubility and non-immunogenicity.

The formed hydrazine in the conjugate is stable under neutral or basic pH, but will be hydrolyzed at acidic pH. This can, for example, be used to conjugate a drug or other similar species to a targeting carrier.

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 297-302; ISBN 978-0-12-370501-3

	Article No.	Quantity	Price
PEG2105 MP-EDA*TFA 2-(3-(Maleimid-1-yl)propanamido)ethanaminium trifluoracetat CAS-NO: 11550-02-00 FORMULA: $C_9H_{14}N_3O_3{}^*C_2F_3O_2$ MOLECULAR WEIGHT: 212,23*113,02 g/mole	PEG2105.0100	100 mg	€ 295,00
	PEG2105.0001	1 g	€ 860,00
PEG1580 mal-dPEG(4)-NHNH-Boc 1-Maleimido-3-oxo-7,10,13,16-tetraoxa-4-azanonadecan-19-oyl-(N'-t-butyloxycarbonyl)hydrazid CAS-NO: 1127247-28-2 FORMULA: $C_{23}H_{38}N_4O_{10}$ MOLECULAR WEIGHT: 530,57 g/mole FURTHER INFORMATION: Spacer length 24 atoms or 27.1 A	PEG1580.0100	100 mg	€ 235,00
	PEG1580.0001	1 g	€ 1025,00
PEG3880 mal-dPEG™(8)-NHNH-Boc alpha-Maleimido-omega-(t-butyloxycarbonylhydrazidopropionate) octa(ethylene glycol) CAS-NO: 1334169-98-0 FORMULA: $C_{31}H_{54}N_4O_{14}$ MOLECULAR WEIGHT: 706,78 g/mole FURTHER INFORMATION: Spacer length 36 atoms or 39.2 A	PEG3880.0100	100 mg	€ 265,00
	PEG3880.1000	1 g	€ 1150,00
PEG3890 mal-dPEG™(12)-NHNH-Boc alpha-Maleimido-omega-(t-butyloxycarbonylhydrazidopropionate) dodeca(ethylene glycol) CAS-NO: 1334169-99-1 FORMULA: $C_{39}H_{70}N_4O_{18}$ MOLECULAR WEIGHT: 882,99 g/mole FURTHER INFORMATION: Spacer length 51 atoms or 51.1 A	PEG3890.0100	100 mg	€ 295,00
	PEG3890.1000	1 g	€ 1250,00

3.8.4 Methoxy-PEG-Maleimides

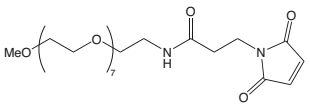
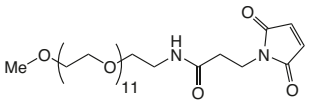
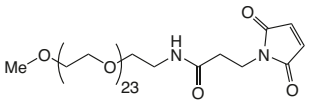
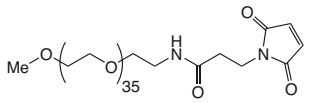
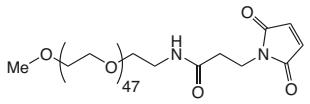
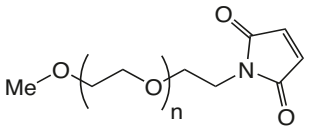
Methoxy-PEG-Maleimides are Sulfhydryl/thiol reactive PEGylation modifiers that can be incorporated into peptides (cysteine), proteins (site directed mutagenesis) or oligonucleotides (thiol modified). They increase water solubility, stability, and hydrodynamic volume and decrease aggregation tendencies.

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 30; ISBN 978-0-12-370501-3

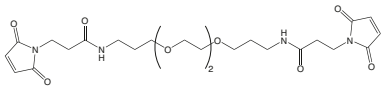
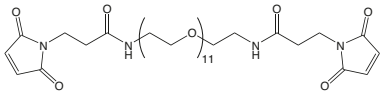
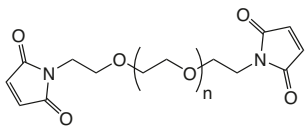
	Article No.	Quantity	Price
PEG2375 MeO-PEG(4)-mal alpha-Methoxy-omega-maleimido tetra(ethylene glycol) CAS-NO: 1263044-81-0 FORMULA: $C_{16}H_{26}N_2O_7$ MOLECULAR WEIGHT: 358,39 g/mole FURTHER INFORMATION: Spacer length 32 atoms or 36.4 A	PEG2375.0100	100 mg	€ 265,00
	PEG2375.0001	1 g	€ 600,00

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG2380 MeO-PEG(8)-mal alpha-Methoxy-omega-maleimido octa(ethylene glycol) CAS-NO: 1334169-90-2 FORMULA: $C_{24}H_{42}N_2O_{11}$ MOLECULAR WEIGHT: 534,6 g/mole FURTHER INFORMATION: Spacer length 32 atoms or 36.4 A		PEG2380.0100 PEG2380.0001	100 mg 1 g	€ 295,00 € 700,00
PEG1665 MeO-dPEG(12)-mal Maleimidyl-N-(2,5,8,11,14,17,20,23,26,29,32,35-dodecaoxahepta-triacontan-37-yl)propanamide CAS-NO: 88504-24-9 FORMULA: $C_{32}H_{58}N_2O_{15}$ MOLECULAR WEIGHT: 710,81 g/mole		PEG1665.0100 PEG1665.0001	100 mg 1 g	€ 325,00 € 875,00
PEG1675 MeO-dPEG(24)-mal alpha-Methoxy-omega-maleimidyl-propanamide 24(ethylene glycol) CAS-NO: 88504-24-9 FORMULA: $C_{56}H_{106}N_2O_{27}$ MOLECULAR WEIGHT: 1239,47 g/mole FURTHER INFORMATION: Spacer length 80 atoms or 50.7 A		PEG1675.0100 PEG1675.0001	100 mg 1 g	€ 355,00 € 1050,00
PEG3360 MeO-dPEG™(36)-mal alpha-Methoxy-omega-maleimidyl-propanamide 36(ethylene glycol) CAS-NO: 88504-24-9 FORMULA: $C_{80}H_{154}N_2O_{39}$ MOLECULAR WEIGHT: 1768,07 g/mole FURTHER INFORMATION: Spacer length 116 atoms or 137.2 A		PEG3360.0100 PEG3360.1000	100 mg 1 g	€ 455,00 € 1600,00
PEG3370 MeO-dPEG™(48)-mal alpha-Methoxy-omega-maleimidyl-propanamide 48(ethylene glycol) CAS-NO: 88504-24-9 FORMULA: $C_{104}H_{202}N_2O_{51}$ MOLECULAR WEIGHT: 2296,7 g/mole FURTHER INFORMATION: Spacer length 152 atoms or 181.2 A		PEG3370.0100 PEG3370.1000	100 mg 1 g	€ 550,00 € 1750,00
PEG1150 MeO-PEG-mal alpha-Methoxy-omega-ethyl-maleimide poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 g/mole		PEG1150.0001 PEG1150.0005	1 g 5 g	€ 200,00 € 700,00
PEG1147 MeO-PEG-mal alpha-Methoxy-omega-ethyl-maleimide poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1147.0001 PEG1147.0005	1 g 5 g	€ 175,00 € 575,00
PEG1149 MeO-PEG-mal alpha-Methoxy-omega-ethyl-maleimide poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1149.0001 PEG1149.0005	1 g 5 g	€ 175,00 € 575,00
PEG1146 MeO-PEG-mal alpha-Methoxy-omega-ethyl-maleimide poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1146.0001 PEG1146.0005	1 g 5 g	€ 200,00 € 675,00
PEG1148 MeO-PEG-mal alpha-Methoxy-omega-ethyl-maleimide poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1148.0001 PEG1148.0005	1 g 5 g	€ 200,00 € 675,00

Prices are in EUR, net, exw Germany

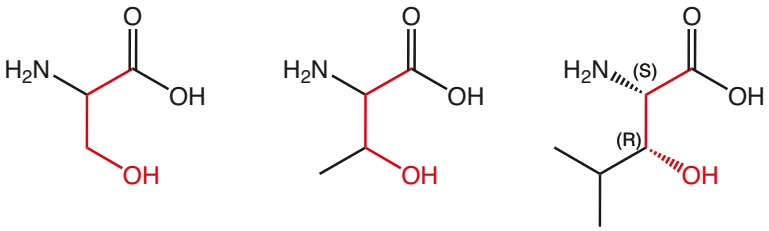
3.8.5 Bis-Maleimido-PEGs

		Article No.	Quantity	Price
PEG1485 **mal-dPEG(3)-mal**		PEG1485.0050	50 mg	€ 200,00
Bis-(1,13-(3-maleimidopropionyl)amido)-4,7,10-trioxatridecane CAS-NO: 756525-89-0 FORMULA: $C_{24}H_{34}N_4O_9$ MOLECULAR WEIGHT: 522,55 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 30.0 A		PEG1485.0001	1 g	€ 860,00
PEG2085 **mal-PEG(11)-mal**		PEG2085.0050	50 mg	€ 295,00
alpha,omega-Bis-[(3-maleimid-1-yl)propanoylamido] undeca(ethylene glycol) CAS-NO: 854753-78-9 FORMULA: $C_{38}H_{62}N_4O_{17}$ MOLECULAR WEIGHT: 846,92 g/mole FURTHER INFORMATION: Spacer length 28 atoms or 30.0 A		PEG2085.0001	1 g	€ 1375,00
PEG1127 **mal-PEG-mal**		PEG1127.0001	1 g	€ 175,00
alpha,omega-Bis-maleimido poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1127.0005	5 g	€ 575,00
PEG1129 **mal-PEG-mal**		PEG1129.0001	1 g	€ 175,00
alpha,omega-Bis-maleimido poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1129.0005	5 g	€ 575,00
PEG1130 **mal-PEG-mal**		PEG1130.0001	1 g	€ 175,00
alpha,omega-Bis-maleimido poly(ethylene glycol) (PEG-MW 6.000 Dalton) MOLECULAR WEIGHT: 6000 Da		PEG1130.0005	5 g	€ 575,00
PEG1126 **mal-PEG-mal**		PEG1126.0001	1 g	€ 175,00
alpha,omega-Bis-maleimido poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1126.0005	5 g	€ 575,00
PEG1128 **mal-PEG-mal**		PEG1128.0001	1 g	€ 175,00
alpha,omega-Bis-maleimido poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1128.0005	5 g	€ 575,00

Reference:

- Bioconjugate Techniques; G. T. Hermanson; 2nd Edition; *Elsevier* 2008; 235-276, 714-718; ISBN 978-0-12-370501-3

Amino Acid Analogues for Peptidomimetics and Medicinal Chemistry.



serine | threonine | 3-hydroxy-leucine
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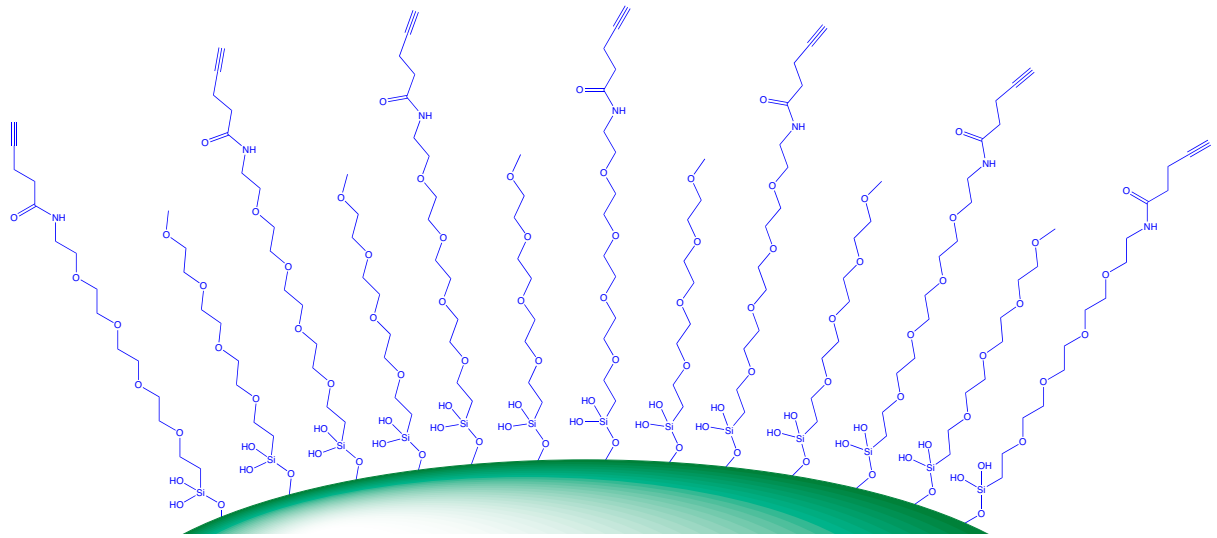
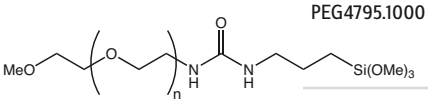
3.9 PEG-Silanes

PEG-Silanes for modification of silicate surfaces

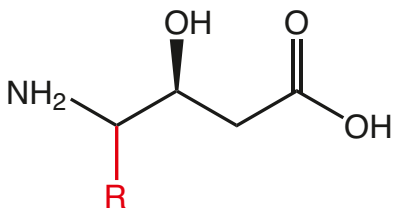


*The broad variety of the Click reaction can be applied on surfaces using appropriate **PEG-silanes**, where silicate particles can be coated with.*



		Article No.	Quantity	Price
PEG4790	**MeO-PEG-Si(OMe)$_3$**	PEG4790.0500	500 mg	€ 175,00
alpha-Methoxy-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG4790.1000	1 g	€ 325,00
PEG4795	**MeO-PEG-Si(OMe)$_3$**	PEG4795.0500	500 mg	€ 175,00
alpha-Methoxy-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG4795.1000	1 g	€ 325,00
PEG4800	**MeO-PEG-Si(OMe)$_3$**	PEG4800.0500	500 mg	€ 175,00
alpha-Methoxy-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG4800.1000	1 g	€ 325,00
PEG4805	**MeO-PEG-Si(OMe)$_3$**	PEG4805.0500	500 mg	€ 175,00
alpha-Methoxy-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG4805.1000	1 g	€ 325,00

Custom Synthesis of Statine Analogues from Alanine through Valine and any other Residue.



R: Ala, Arg(Pbf), Asn(Trt) ..... Trp(Boc), Tyr(tBu), Val

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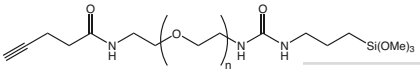
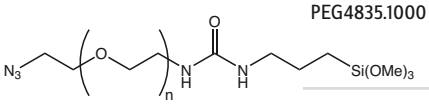
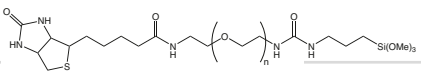
		Article No.	Quantity	Price
PEG4810	**Alkyne-PEG-Si(OMe)$_3$** alpha-Propargylacetamido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG4810.0500	500 mg	€ 500,00
		PEG4810.1000	1 g	€ 900,00
PEG4815	**Alkyne-PEG-Si(OMe)$_3$** alpha-Propargylacetamido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG4815.0500	500 mg	€ 500,00
		PEG4815.1000	1 g	€ 900,00
PEG4820	**Alkyne-PEG-Si(OMe)$_3$** alpha-Propargylacetamido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG4820.0500	500 mg	€ 500,00
		PEG4820.1000	1 g	€ 900,00
PEG4825	**Alkyne-PEG-Si(OMe)$_3$** alpha-Propargylacetamido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da	PEG4825.0500	500 mg	€ 500,00
		PEG4825.1000	1 g	€ 900,00



		Article No.	Quantity	Price
PEG4830	**Azido-PEG-Si(OMe)$_3$** alpha-Azido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG4830.0500	500 mg	€ 500,00
		PEG4830.1000	1 g	€ 900,00
PEG4835	**Azido-PEG-Si(OMe)$_3$** alpha-Azido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG4835.0500	500 mg	€ 500,00
		PEG4835.1000	1 g	€ 900,00
PEG4840	**Azido-PEG-Si(OMe)$_3$** alpha-Azido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG4840.0500	500 mg	€ 500,00
		PEG4840.1000	1 g	€ 900,00
PEG4845	**Azido-PEG-Si(OMe)$_3$** alpha-Azido-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da	PEG4845.0500	500 mg	€ 500,00
		PEG4845.1000	1 g	€ 900,00



		Article No.	Quantity	Price
PEG4850	**Biotin-PEG-Si(OMe)$_3$** alpha-Biotinyl-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da	PEG4850.0500	500 mg	€ 500,00
		PEG4850.1000	1 g	€ 900,00
PEG4855	**Biotin-PEG-Si(OMe)$_3$** alpha-Biotinyl-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da	PEG4855.0500	500 mg	€ 500,00
		PEG4855.1000	1 g	€ 900,00
PEG4860	**Biotin-PEG-Si(OMe)$_3$** alpha-Biotinyl-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da	PEG4860.0500	500 mg	€ 500,00
		PEG4860.1000	1 g	€ 900,00
PEG4865	**Biotin-PEG-Si(OMe)$_3$** alpha-Biotinyl-omega-trimethoxysilyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da	PEG4865.0500	500 mg	€ 500,00
		PEG4865.1000	1 g	€ 900,00



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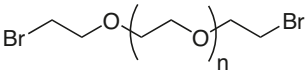
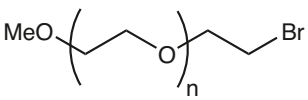
3.10 Other PEG Reagents

3.10.1 Bromo-PEGs

		Article No.	Quantity	Price
PEG1076 **Br-PEG-Br** alpha,omega-Bis-bromo poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1076.0001 PEG1076.0005	1 g 5 g	€ 75,00 € 275,00
PEG1078 **Br-PEG-Br** alpha,omega-Bis-bromo poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1078.0001 PEG1078.0005	1 g 5 g	€ 75,00 € 275,00
PEG1079 **Br-PEG-Br** alpha,omega-Bis-bromo poly(ethylene glycol) (PEG-MW 6.000 Dalton) MOLECULAR WEIGHT: 6000 Da		PEG1079.0001 PEG1079.0005	1 g 5 g	€ 75,00 € 275,00
PEG1075 **Br-PEG-Br** alpha,omega-Bis-bromo poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1075.0001 PEG1075.0005	1 g 5 g	€ 75,00 € 275,00
PEG1077 **Br-PEG-Br** alpha,omega-Bis-bromo poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1077.0001 PEG1077.0005	1 g 5 g	€ 75,00 € 275,00

PEG1135 **MeO-PEG-Br** alpha-Methoxy-omega-bromo poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 Da		PEG1135.0001 PEG1135.0005	1 g 5 g	€ 90,00 € 350,00
PEG1132 **MeO-PEG-Br** alpha-Methoxy-omega-bromo poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1132.0001 PEG1132.0005	1 g 5 g	€ 75,00 € 275,00
PEG1134 **MeO-PEG-Br** alpha-Methoxy-omega-bromo poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1134.0001 PEG1134.0005	1 g 5 g	€ 75,00 € 275,00
PEG1131 **MeO-PEG-Br** alpha-Methoxy-omega-bromo poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1131.0001 PEG1131.0005	1 g 5 g	€ 90,00 € 350,00
PEG1133 **MeO-PEG-Br** alpha-Methoxy-omega-bromo poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1133.0001 PEG1133.0005	1 g 5 g	€ 90,00 € 350,00

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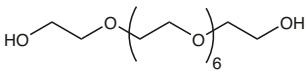
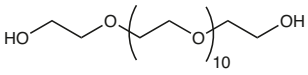
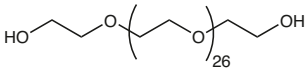
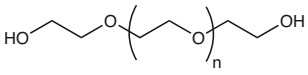
3.10.2 Bishydroxy-PEGs

		Article No.	Quantity	Price
PEG1016 **HO-PEG(8)-OH**		PEG1016.0005	5 g	€ 250,00
Octa-ethylene glycol CAS-NO: 5117-19-1 FORMULA: $C_{16}H_{34}O_9$ MOLECULAR WEIGHT: 370,44 g/mole		PEG1016.0025	25 g	€ 750,00
PEG1015 **HO-PEG(12)-OH**		PEG1015.0005	5 g	€ 350,00
Dodeca-ethylene glycol CAS-NO: 6790-09-6 FORMULA: $C_{24}H_{50}O_{13}$ MOLECULAR WEIGHT: 546,65 g/mole FURTHER INFORMATION: Spacer length 37 atoms or 42.8 A		PEG1015.0025	25 g	€ 1100,00
PEG1009 **HO-PEG(28)-OH**		PEG1009.0001	1 g	€ 200,00
alpha,omega-Bis-hydroxy 28(ethylene glycol) FORMULA: $C_{56}H_{114}O_{29}$ MOLECULAR WEIGHT: 1251,49 g/mole		PEG1009.0005	5 g	€ 575,00
PEG1011 **HO-PEG-OH**		PEG1011.0005	5 g	€ 60,00
alpha,omega-Bis-hydroxy poly(ethylene glycol) (PEG-MW 2.000 Dalton) CAS-NO: 25322-68-3 MOLECULAR WEIGHT: 2000 Da		PEG1011.0025	25 g	€ 150,00
PEG1013 **HO-PEG-OH**		PEG1013.0005	5 g	€ 60,00
alpha,omega-Bis-hydroxy poly(ethylene glycol) (PEG-MW 3.000 Dalton) CAS-NO: 25322-68-3 MOLECULAR WEIGHT: 3000 Da		PEG1013.0025	25 g	€ 150,00
PEG1014 **HO-PEG-OH**		PEG1014.0005	5 g	€ 60,00
alpha,omega-Bis-hydroxy poly(ethylene glycol) (PEG-MW 6.000 Dalton) CAS-NO: 25322-68-3 MOLECULAR WEIGHT: 6000 Da		PEG1014.0025	25 g	€ 150,00
PEG1010 **HO-PEG-OH**		PEG1010.0005	5 g	€ 60,00
alpha,omega-Bis-hydroxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) CAS-NO: 25322-68-3 MOLECULAR WEIGHT: 10000 Da		PEG1010.0025	25 g	€ 150,00
PEG1012 **HO-PEG-OH**		PEG1012.0005	5 g	€ 60,00
alpha,omega-Bis-hydroxy poly(ethylene glycol) (PEG-MW 20.000 Dalton) CAS-NO: 25322-68-3 MOLECULAR WEIGHT: 20000 Da		PEG1012.0025	25 g	€ 150,00

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3.10.3 Methoxy-PEG-Alcohols

Methoxy-PEG-Alcohols are useful intermediates to design other reactive PEG species. The hydroxyl function can be derivatized to a variety of other functionalities. Potential PEGylation applications for this reagent include:

1. surface modification;
2. increasing solubility;
3. blocking/capping.

Methoxy-PEG-Alcohols will reduce or eliminate non-specific interactions and aggregation, reduce immunogenicity and increase water solubility.

		Article No.	Quantity		Price
PEG1720	**MeO-EG(2)-Tos** 2-(2-Methoxyethoxy)ethyl 4-methylbenzenesulfonate CAS-NO: 50586-80-6 FORMULA: $C_{12}H_{18}O_5S$ MOLECULAR WEIGHT: 274,33 g/mole FURTHER INFORMATION: Spacer length 7 atoms or 8.4 A	PEG1720.0001	1 g	€	265,00
PEG2155	**MeO-PEG(4)-OH** 2,5,8,11-Tetraoxatridecan-13-ol CAS-NO: 23783-42-8 FORMULA: $C_9H_{20}O_5$ MOLECULAR WEIGHT: 208,25 g/mole FURTHER INFORMATION: Spacer length 14 atoms or 46.3 A	PEG2155.0100 PEG2155.0001	100 mg 1 g	€ €	160,00 325,00
PEG1695	**MeO-dPEG(4)-Tos** 2,5,8,11-Tetraoxatridecan-13-yl 4-methylbenzenesulfonate CAS-NO: 62921-76-0 FORMULA: $C_{16}H_{26}O_7S$ MOLECULAR WEIGHT: 362,44 g/mole FURTHER INFORMATION: Spacer length 13 atoms or 15.4 A	PEG1695.0001	1 g	€	385,00
PEG1032	**MeO-PEG(7)-OH** Hepta(ethylene glycol) methylether CAS-NO: 4437-01-8 FORMULA: $C_{15}H_{32}O_8$ MOLECULAR WEIGHT: 340,41 g/mole FURTHER INFORMATION: spacer length 23 atoms or 26.1 A	PEG1032.0100 PEG1032.0001 PEG1032.0005	100 mg 1 g 5 g	€ € €	150,00 250,00 650,00
PEG3820	**MeO-dPEG™(7)-Tos** alpha-Methoxy-omega-tosyl hepta(ethylene glycol) CAS-NO: 79622-11-0 FORMULA: $C_{22}H_{38}O_{10}S$ MOLECULAR WEIGHT: 494,6 g/mole FURTHER INFORMATION: Spacer length 22 atoms or 26.0 A	PEG3820.1000	1 g	€	515,00
PEG1038	**MeO-PEG(11)-OH** Undecae(ethylene glycol) methylether CAS-NO: 114740-40-8 FORMULA: $C_{23}H_{48}O_{12}$ MOLECULAR WEIGHT: 516,62 g/mole FURTHER INFORMATION: Spacer length 35 atoms or 40.3 A	PEG1038.0001 PEG1038.0005	1 g 5 g	€ €	325,00 800,00
PEG3250	**MeO-dPEG™(15)-OH** Pentadecae(ethylene glycol) methylether CAS-NO: 114740-40-8 FORMULA: $C_{31}H_{64}O_{16}$ MOLECULAR WEIGHT: 692,83 g/mole FURTHER INFORMATION: Spacer length 46 atoms or 54.7 A	PEG3250.0100 PEG3250.1000	100 mg 1 g	€ €	225,00 455,00

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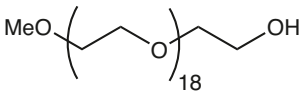
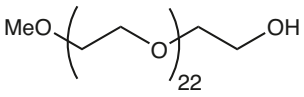
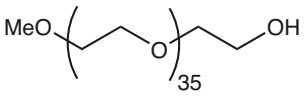
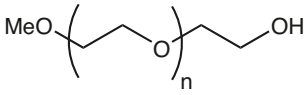
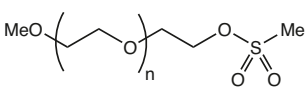
		Article No.	Quantity	Price
PEG3260 MeO-dPEG™(19)-OH Nonadecae(ethylene glycol) methylether CAS-NO: 114740-40-8 FORMULA: $C_{39}H_{80}O_{20}$ MOLECULAR WEIGHT: 869,04 g/mole FURTHER INFORMATION: Spacer length 58 atoms or 69.0 A		PEG3260.0100 PEG3260.1000	100 mg 1 g	€ 235,00 € 575,00
PEG3270 MeO-dPEG™(23)-OH alpha-Methoxy-omega-hydroxy-23(ethylene glycol) CAS-NO: 114740-40-8 FORMULA: $C_{47}H_{96}O_{24}$ MOLECULAR WEIGHT: 1045,25 g/mole FURTHER INFORMATION: Spacer length 70 atoms or 83.1 A		PEG3270.0100 PEG3270.1000	100 mg 1 g	€ 265,00 € 695,00
PEG3280 MeO-dPEG™(36)-OH alpha-Methoxy-omega-hydroxy-36(ethylene glycol) CAS-NO: 114740-40-8 FORMULA: $C_{73}H_{148}O_{37}$ MOLECULAR WEIGHT: 1617,93 g/mole FURTHER INFORMATION: Spacer length 109 atoms or 130.1 A		PEG3280.0100 PEG3280.1000	100 mg 1 g	€ 455,00 € 1150,00
PEG1037 MeO-PEG-OH alpha-Methoxy-omega-hydroxy poly(ethylene glycol) (PEG-MW 750 Dalton) CAS-NO: 9004-74-4 MOLECULAR WEIGHT: 750 Da		PEG1037.0005 PEG1037.0025	5 g 25 g	€ 60,00 € 150,00
PEG1034 MeO-PEG-OH alpha-Methoxy-omega-hydroxy poly(ethylene glycol) (PEG-MW 2.000 Dalton) CAS-NO: 9004-74-4 MOLECULAR WEIGHT: 2000 Da		PEG1034.0005 PEG1034.0025	5 g 25 g	€ 60,00 € 150,00
PEG1036 MeO-PEG-OH alpha-Methoxy-omega-hydroxy poly(ethylene glycol) (PEG-MW 5.000 Dalton) CAS-NO: 9004-74-4 MOLECULAR WEIGHT: 5000 Da		PEG1036.0005 PEG1036.0025	5 g 25 g	€ 60,00 € 150,00
PEG1033 MeO-PEG-OH alpha-Methoxy-omega-hydroxy poly(ethylene glycol) (PEG-MW 10.000 Dalton) CAS-NO: 9004-74-4 MOLECULAR WEIGHT: 10000 Da		PEG1033.0001 PEG1033.0005	1 g 5 g	€ 100,00 € 350,00
PEG1035 MeO-PEG-OH alpha-Methoxy-omega-hydroxy poly(ethylene glycol) (PEG-MW 20.000 Dalton) CAS-NO: 9004-74-4 MOLECULAR WEIGHT: 20000 Da		PEG1035.0001 PEG1035.0005	1 g 5 g	€ 100,00 € 350,00
PEG1218 MeO-PEG-OMs alpha-Methoxy-omega-mesitylate poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1218.0001 PEG1218.0005	1 g 5 g	€ 75,00 € 300,00

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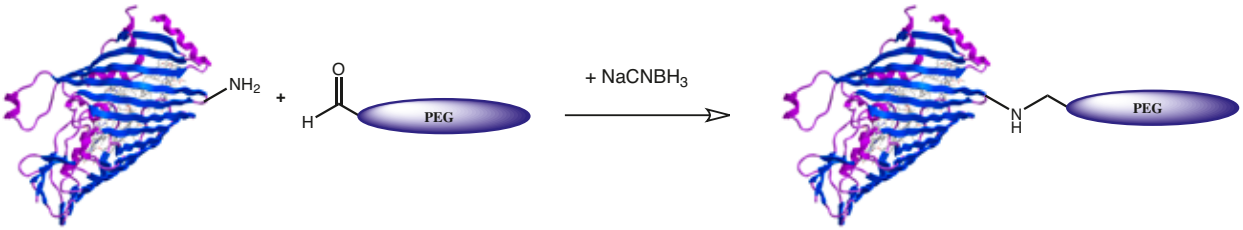
3.10.4 PEG-Aldehydes

PEG-Aldehydes are amine and hydrazide reactive PEGylating reagents usually converted to a secondary amine via reductive amination protocols.

They are highly water soluble, non-immunogenic and reduce aggregation and toxicity.



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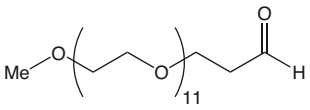
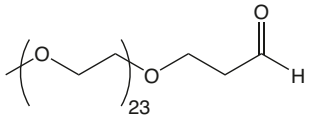
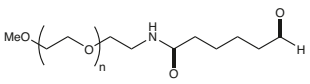
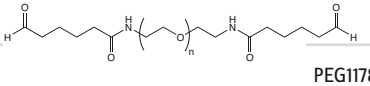
	Article No.	Quantity	Price
PEG2170 MeO-PEG(4)-CHO			
alpha-Methoxy-omega-propanal tetra(ethylene glycol) CAS-NO: 197513-96-5 FORMULA: $C_{10}H_{20}O_5$ MOLECULAR WEIGHT: 220,26 g/mole FURTHER INFORMATION: Spacer length 14 atoms or 16.5 A	PEG2170.0100	100 mg	€ 175,00
	PEG2170.0001	1 g	€ 695,00
PEG2175 MeO-PEG(8)-CHO			
alpha-Methoxy-omega-propanal octa(ethylene glycol) CAS-NO: 1234369-95-9 FORMULA: $C_{18}H_{36}O_9$ MOLECULAR WEIGHT: 396,47 g/mole FURTHER INFORMATION: Spacer length 27 atoms or 29.8 A	PEG2175.0100	100 mg	€ 175,00
	PEG2175.0001	1 g	€ 695,00

Prices are in EUR, net, exw Germany

		Article No.	Quantity	Price
PEG2335 **MeO-PEG(11)-PrCHO** alpha-Methoxy-omega-propional undeca(ethylene glycol) CAS-NO: 125061-88-3 FORMULA: $C_{26}H_{52}O_{13}$ MOLECULAR WEIGHT: 572,68 g/mole FURTHER INFORMATION: Spacer length 38 atoms or 44.0 A		PEG2335.0100 PEG2335.0001	100 mg 1 g	€ 235,00 € 1025,00
PEG2180 **MeO-PEG(24)-CHO** alpha-Methoxy-omega-propanal 24(ethylene glycol) CAS-NO: 125061-88-3 FORMULA: $C_{50}H_{100}O_{25}$ MOLECULAR WEIGHT: 1101,31 g/mole FURTHER INFORMATION: Spacer length 74 atoms or 86.4 A		PEG2180.0100 PEG2180.0001	100 mg 1 g	€ 295,00 € 1375,00
PEG1145 **MeO-PEG-CHO** alpha-Methoxy-omega-formyl poly(ethylene glycol) (PEG-MW 750 Dalton) MOLECULAR WEIGHT: 750 g/mole		PEG1145.0001 PEG1145.0005	1 g 5 g	€ 275,00 € 675,00
PEG1142 **MeO-PEG-CHO** alpha-Methoxy-omega-formyl poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1142.0001 PEG1142.0005	1 g 5 g	€ 200,00 € 450,00
PEG1144 **MeO-PEG-CHO** alpha-Methoxy-omega-formyl poly(ethylene glycol) (PEG-MW 5.000 Dalton) MOLECULAR WEIGHT: 5000 Da		PEG1144.0001 PEG1144.0005	1 g 5 g	€ 200,00 € 450,00
PEG1141 **MeO-PEG-CHO** alpha-Methoxy-omega-formyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1141.0001 PEG1141.0005	1 g 5 g	€ 225,00 € 575,00
PEG1143 **MeO-PEG-CHO** alpha-Methoxy-omega-formyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1143.0001 PEG1143.0005	1 g 5 g	€ 225,00 € 575,00
PEG1179 **OHC-PEG-CHO** alpha,omega-Bis-formyl poly(ethylene glycol) (PEG-MW 2.000 Dalton) MOLECULAR WEIGHT: 2000 Da		PEG1179.0001 PEG1179.0005	1 g 5 g	€ 200,00 € 450,00
PEG1181 **OHC-PEG-CHO** alpha,omega-Bis-formyl poly(ethylene glycol) (PEG-MW 3.000 Dalton) MOLECULAR WEIGHT: 3000 Da		PEG1181.0001 PEG1181.0005	1 g 5 g	€ 200,00 € 450,00
PEG1182 **OHC-PEG-CHO** alpha,omega-Bis-formyl poly(ethylene glycol) (PEG-MW 6.000 Dalton) MOLECULAR WEIGHT: 6000 Da		PEG1182.0001 PEG1182.0005	1 g 5 g	€ 200,00 € 450,00
PEG1178 **OHC-PEG-CHO** alpha,omega-Bis-formyl poly(ethylene glycol) (PEG-MW 10.000 Dalton) MOLECULAR WEIGHT: 10000 Da		PEG1178.0001 PEG1178.0005	1 g 5 g	€ 200,00 € 450,00
PEG1180 **OHC-PEG-CHO** alpha,omega-Bis-formyl poly(ethylene glycol) (PEG-MW 20.000 Dalton) MOLECULAR WEIGHT: 20000 Da		PEG1180.0001 PEG1180.0005	1 g 5 g	€ 200,00 € 450,00

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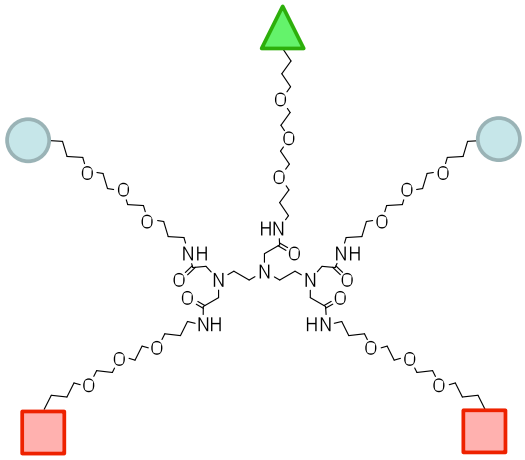
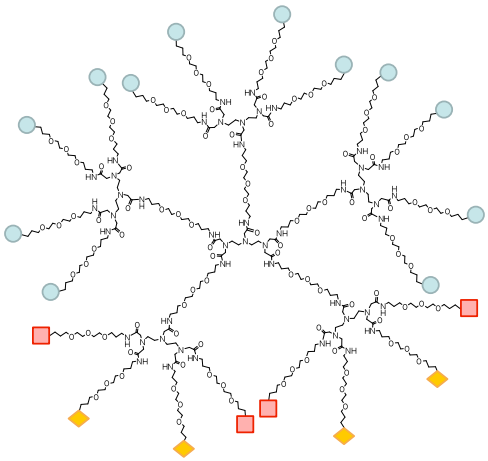
4. Pentrimers – Penta-Valent PEG-Based Dendrimers



First generation pentavalent PEG based dendrimer with three different reactive groups, for example Click reactive, carboxylic acid (amine reactive) and protected amine (nucleophilic).



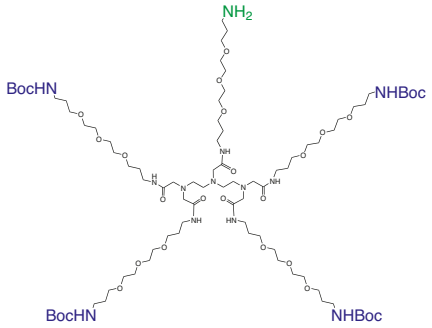
Second generation dendrimer based on a pentavalent PEG based building block for sophisticated applications in drug delivery, diagnostics, combination therapy or personalized medicine.

DDN2000 PEG-Pentrimer-G1-(NH_2+4xBoc-NH)

Pentavalent PEG based Dendrimer-Generation-1 with one amino and four t-butyloxycarbonylamino functions

FORMULA: $C_{84}H_{165}N_{13}O_{28}$

MOLECULAR WEIGHT: 1805,28 g/mole



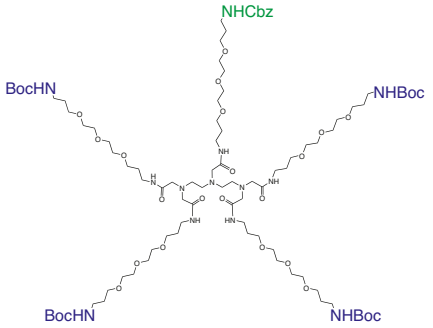
DDN2000.0250	250 mg	€	350,00
DDN2000.0001	1 g	€	875,00

DDN2010 PEG-Pentrimer-G1-(Z-NH+4xBoc-NH)

Pentavalent PEG based Dendrimer-Generation-1 with one benzyloxycarbonylamino and four t-butyloxycarbonylamino functions

FORMULA: $C_{92}H_{171}N_{13}O_{30}$

MOLECULAR WEIGHT: 1939,41 g/mole



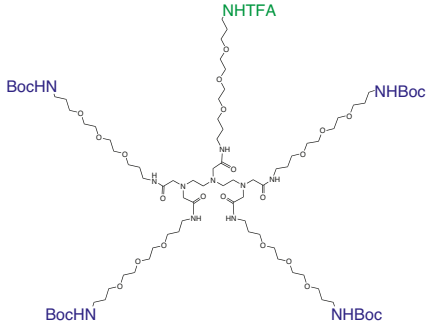
DDN2010.0250	250 mg	€	325,00
DDN2010.0001	1 g	€	875,00

DDN2020 PEG-Pentrimer-G1-(TFA-NH+4xBoc-NH)

Pentavalent PEG based Dendrimer-Generation-1 with one trifluoroacetamido and four t-butyloxycarbonylamino functions

FORMULA: $C_{86}H_{164}F_3N_{13}O_{29}$

MOLECULAR WEIGHT: 1901,29 g/mole



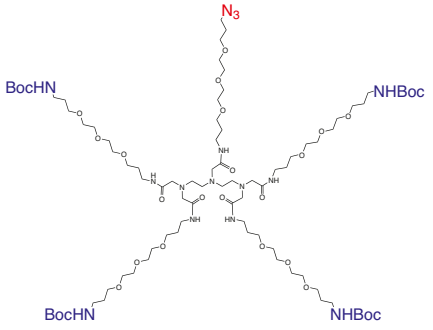
DDN2020.0250	250 mg	€	325,00
DDN2020.0001	1 g	€	875,00

DDN2030 PEG-Pentrimer-G1-(N_3+4xBoc-NH)

Pentavalent PEG based Dendrimer-Generation-1 with one azido and four t-butyloxycarbonylamino functions

FORMULA: $C_{84}H_{163}N_{15}O_{28}$

MOLECULAR WEIGHT: 1831,28 g/mole



DDN2030.0250	250 mg	€	325,00
DDN2030.0001	1 g	€	875,00

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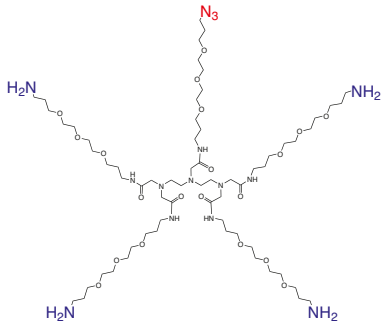
DDN2040 PEG-Pentrimer-G1-(N_3+4xNH_2)*4HCl

Pentavalent PEG based Dendrimer-Generation-1 with one azido and four amino functions, tetrahydrochloride

FORMULA: $C_{64}H_{131}N_{15}O_{20}$*4HCl

MOLECULAR WEIGHT: 1430,81*145,81 g/mole



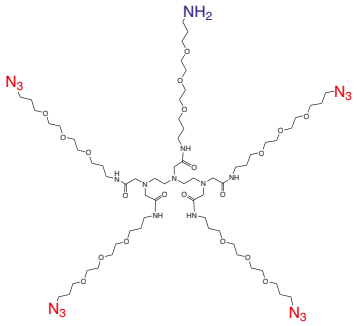
DDN2040.0250	250 mg	€	325,00
DDN2040.0001	1 g	€	875,00

DDN2050 PEG(3)-Pentrimer-G1-(NH_2+4xN_3)*4HCl

Pentavalent PEG(3) based Dendrimer-Generation-1 with one amino and four azido functions, tetrahydrochloride

FORMULA: $C_{64}H_{125}N_{21}O_{20}$*4HCl

MOLECULAR WEIGHT: 1508,81*145,81 g/mole



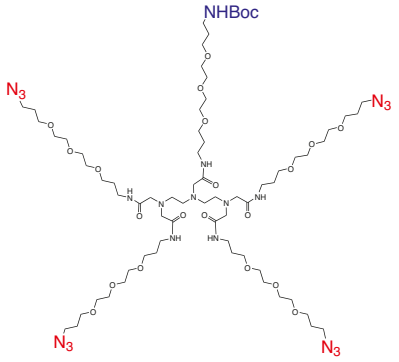
DDN2050.0250	250 mg	€	350,00
DDN2050.0001	1 g	€	990,00

DDN2060 PEG-Pentrimer-G1-(Boc-NH+4xN_3)

Pentavalent PEG based Dendrimer-Generation-1 with one t-butyloxycarbonylamino and four azido functions

FORMULA: $C_{69}H_{133}N_{21}O_{22}$

MOLECULAR WEIGHT: 1608,92 g/mole



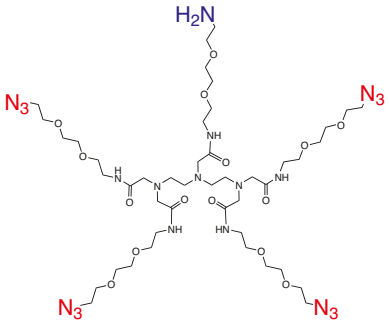
DDN2060.0250	250 mg	€	350,00
DDN2060.0001	1 g	€	990,00

DDN2070 PEG(2)-Pentrimer-G1-(NH_2+4xN_3)*4HCl

Pentavalent PEG(2) based Dendrimer-Generation-1 with one amino and four azido functions, tetrahydrochloride

FORMULA: $C_{44}H_{85}N_{21}O_{15}$*4HCl

MOLECULAR WEIGHT: 1148,28*145,81 g/mole



DDN2070.0250	250 mg	€	350,00
DDN2070.0001	1 g	€	990,00
DDN2070.0005	5 g	€	2275,00

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5. Index

5.1 Code Index

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5.2 Name Index

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Notes

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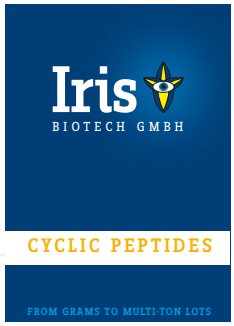

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