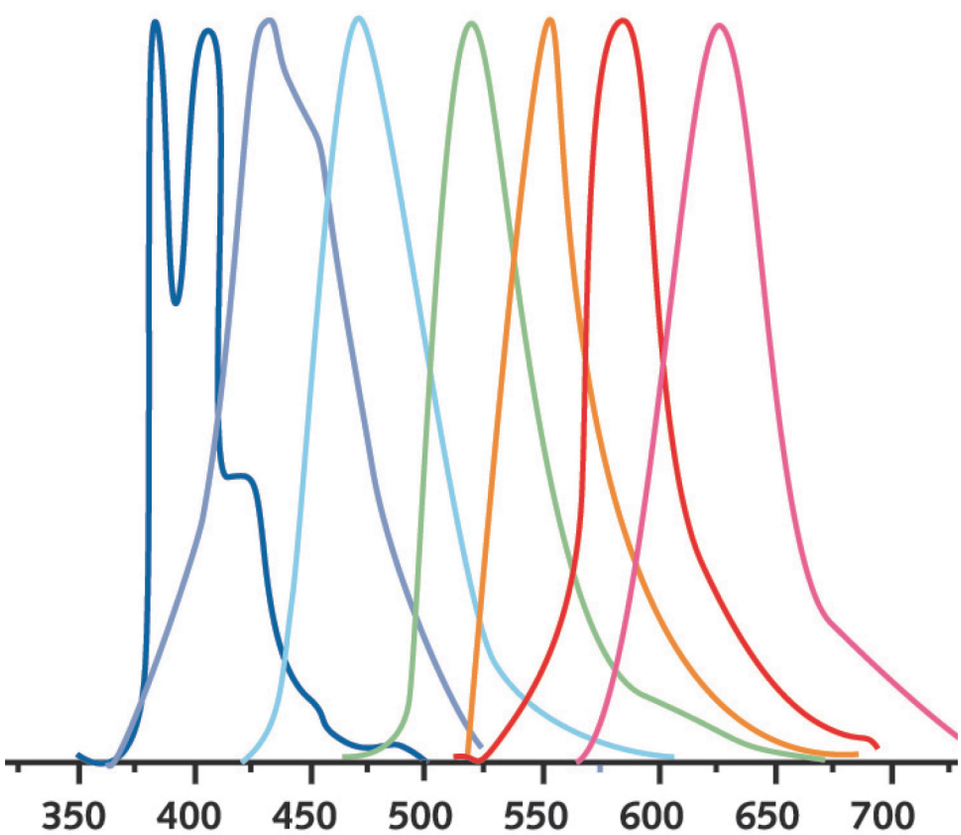
Fluorescent Probes for Protein and Nucleic Acid Labeling

Reference Dyes, Amino-, Thiol- & Carbonyl-Reactive Dyes, Biotins & Avidins, Protein & Nucleic Acid Labeling Kits, and Reagents for Click-Chemistry!



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Content

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1. Fluorescence Technologies and Their Applications

1.1 Introduction to fluorescence

Fluorescence is the molecular absorption of light energy at one wavelength and its nearly instantaneous re-emission at another wavelength (typically longer). Light is absorbed by molecules in about 10^{-15} seconds which causes electrons to become excited to a higher electronic state. The electrons remain in the excited state for about 10^{-8} seconds, and then return to the ground state assuming all of the excess energy is not lost by collisions with other molecules. Energy is emitted during the time when electrons return to their ground state. Emitted light always has a longer wavelength than the absorbed light due to limited energy loss by the molecule prior to emission. This process is illustrated in **Figure 1.** For illustration purpose, http://www.olympusmicro.com/primer/java/jablonski/ provides a live demonstration of the fluorescence process.

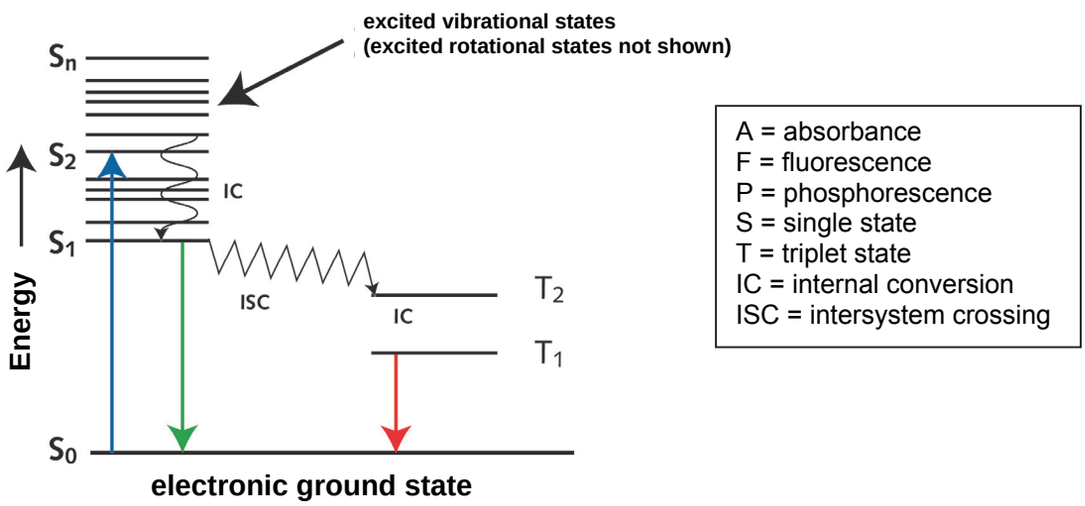


Figure 1. Jablonski diagram illustrating the creation of fluorescence

Fluorescent compounds have two characteristic spectra: an excitation spectrum (the wavelength and amount of light absorbed) and an emission spectrum (the wavelength and amount of light emitted). Both absorption and radiation (emission) of energy are unique characteristics of a particular molecule during the fluorescence process. Measurement of fluorescence is chosen for its extraordinary sensitivity, high specificity, simplicity, and low cost as compared to other analytical modes. Fluorescence measurements can be 10-1000-fold more sensitive than absorbance measurements. It is a widely accepted and powerful technique that is used for a variety of environmental, industrial, and biotechnology applications. It is a valuable analytical tool for both quantitative and qualitative analyses.

- *High Sensitivity:* Limits of detection largely depend on the properties of the molecule and surrounding environments being measured. ppb (parts per billion) or even ppt (parts per trillion) detection limit is achievable for most analytes. This extraordinary sensitivity allows the reliable detection of fluorescent materials even when small sample sizes are being used.

- *Low Interference:* Spectrophotometric measurement of light absorption by an analyte is prone to interference problems because many materials absorb light, making it difficult to isolate the targeted analyte in a complex matrix. Fluorimetric measurements are highly specific and less susceptible to interferences because much fewer materials absorb and also emit light (fluoresce).

- *Large Dynamic Range:* Fluorescence output is linear to sample concentration over a very broad range. Fluorimetric measurements can be used over three to six magnitudes of concentration without sample dilution or modification of the sample cell.

- *High Throughput:* Fluorimetric measurement is a relatively simple analytical technique. Its high sensitivity and low interference reduce or eliminate the sample preparation procedures that often require to concentrate analytes or to remove interferences from samples prior to analysis. Most fluorescence-based assays can be automated for high throughput screening applications.

Fluorescence is a technology that is now used routinely in life science research. Fluorescence reagents are used extensively to trace the presence of biomolecules in cells and other biological systems. The great advancement of fluorescence reagents has promoted a host of more complex fluorescence technologies such as fluorescence resonance energy transfer (FRET), time-resolved fluorescence (TRF), fluorescence polarization (FP), fluorescence recovery after photobleaching (FRAP), fluorescence activated cell sorting (FACS), fluorescence correlation spectroscopy (FCS), etc. Excitation and emission wavelength, fluorescence quantum yield, fluorescence lifetime, size, photostability, and biological functionality are important factors to be considered in selection of a desired fluorescent probe for your applications.

1.2 Fluorescence instruments

There are three primary kinds of instruments that measure fluorescence: spectrofluorometers (e.g., fluorometers, flow cytometers, and microplate readers), fluorescence scanners (e.g., equipment for electrophoresis and microarrays), and fluorescence imagers (e.g., microscopes). A generic fluorescence detection system consists of the following essential components:

- *Light Source:* The light source provides the energy that excites the compound of interest by emitting light. Light sources include xenon lamps, high pressure mercury vapor lamps, xenon-mercury arc lamps, lasers, and LEDs. Lamps emit a broad range of light that has more wavelengths than those required to excite the compound. Xenon lamps are very versatile and powerful, providing light output from 190-1200 nm. Mercury vapor lamps are usually more intense than xenon lamps, but the intensity is concentrated in wavelengths of the Hg spectrum. Convenient and inexpensive tunable lasers have long been sought for spectroscopic uses. Lasers and LEDs emit more specific wavelengths. Most fluorescence instruments are equipped with 488 nm excitation of an Argon laser.

- *Excitation Filter:* The excitation filter is used to screen out the wavelengths of light not absorbed by the compound being measured. This filter allows a selected band of light energy to pass through and excite the sample. It blocks other wavelengths, especially those in the emission spectrum.

- *Optical Filter:* Although more monochromator-based scanning fluorescence instruments are becoming available, there are many fluorescence instruments that still require filters. Optical filters are chosen to be optimal for each application, cost effective, and durable. Filters are used to selectively pass a portion of the ultraviolet or visible spectrum. In combination with a light source, the excitation filter allows only light which excites the molecule of interest to strike the sample. The emission filter allows the fluorescence from the sample to pass to the detector and blocks stray light from the light source or interfering components in the sample. For technical details of optical filters, please visit the filter manufacturers' websites.

- *Photodetector:* The detection limit of a fluorescence instrument largely depends upon the detector that it uses. There are three major classes of photodetectors: photoemissive devices (e.g., photomultiplier tube), charge-coupled devices (CCD), and photoconductive devices (e.g., light-dependent resistor). For technical details, please visit the manufacturers' websites.

There is a large number of innovative fluorescence instruments developed for biological applications. To choose an appropriate fluorescence instrument for your research, there are a few critical factors. Sensitivity, dynamic range, stability, and throughput are important instrument factors to be considered.

- *Sensitivity:* Sensitivity of a fluorometer refers to the minimum detectable quantity of a compound of interest under specified instrument conditions. It is related to two factors: signal-to-noise and signal-to-blank. Practically, sensitivity means the minimum concentration that can be measured above background fluorescence of the interferences. Note that when comparing two instruments for sensitivity, absolute numbers are meaningless. One cannot simply read a sample and a blank in two instruments and say the instrument with the "highest" numbers is more sensitive.

- *Signal-to-Noise:* Signal refers to the reading of light passed through a sample. Noise refers to the output from the instrument's electronics, which is present whether or not a sample is being read.

- *Signal-to-Blank:* This is related to signal-to-noise but not the same. Signal refers to the reading of a sample. Blank refers to the matrix liquid containing none of the compound to be measured and scattered light. Signal-to-blank ratio can be determined by measuring blank against sample concentration and determining the ratio. Signal-to-blank ratio can be improved by employing better optics for the specific chemistry. A comparison of minimum detection limits among fluorometers is often made by using a stable fluorescent compound as a reference standard. This can work well in many cases, provided the instruments are properly and “equivalently” set up and operated. The standard must be pure and properly diluted and stable. In this brochure an example for a fluorescence reference standard kit is listed for fluorescence instrument calibration. The compounds are carefully chosen and purified, and it is guaranteed that these dyes give the same corrected fluorescence spectra from batch to batch. The fluorescence instrument calibration kit contains a set of stable and water-soluble dyes to cover the full fluorescence spectrum.

- *Dynamic Range:* Dynamic range refers to the range of concentrations an instrument can read, from the minimum to the maximum detectable. The minimum detectable concentration is determined by signal-to-noise and signal-to-blank ratios. The maximum detectable concentration is determined by the compound’s chemistry and by factors such as instrument sensitivity ranges, optical path length, specificity of optical filters, etc.

- *Instrument Stability:* An electronically stable fluorescence instrument is especially important to produce consistent analytical results over long periods of time.

- *Instrument Throughput:* The throughput of a fluorescence instrument becomes increasingly important. High-throughput screening of drug molecules has become an essential part in drug discovery. There are many advanced fluorescence detection systems dedicated to drug discovery applications, e.g., IN Cell Analysis Systems and LEADseeker (Amersham Biosciences), FLIPR™ microplate reader (Molecular Devices Corporation), ArrayScan® VTI HCS Reader (Cellomics, Inc.), ImageTrak™ Epi-Fluorescence System, and ViewLux CCD Imager (Perkin-Elmer Corporation).

1.3 Fluorescence instrument calibration and reference standards

Fluorescence is a relative measurement and the optics and electronics of each instrument vary, from manufacturer to manufacturer, even among instruments from the same manufacturer. A fluorescence instrument must be calibrated and recalibrated whenever the optics or filters are changed. As discussed above, fluorescence is subject to temperature and other environmental effects. It is important to calibrate the fluorometer in conditions as close as possible to the actual conditions for your study. Sample readings are only as accurate as the standard and blank used to calibrate the instrument. It is important to be rigorous in laboratory procedures, such as cleaning labware and carefully preparing standards.

Most fluorescence instruments can be calibrated with well-characterized stable fluorescent dyes. We offer a number of fluorescence reference standard compounds for fluorescence instrument calibration. These products are carefully chosen and purified, and we guarantee that these compounds give the same corrected fluorescence spectra from batch to batch. The AnaStandard™ fluorescence instrument calibration kit contains a set of stable and water-soluble dyes to cover the full fluorescence spectrum. All the dyes in the kit are water soluble, and have similar fluorescence quantum yields and photostabilities in water or aqueous buffer. These characteristics make the kits good choices for both calibrating fluorescence instruments and trouble-shooting fluorescence assays.

1.4 Selection of fluorescent reagents

Fluorescence is a technology that is now used routinely in life science research. Fluorescence reagents are used extensively to trace the presence of biomolecules in cells and other biological systems. The great advance of fluorescence reagents has promoted a host of more complex fluorescence technologies such as fluorescence resonance energy transfer (FRET), time-resolved fluorescence (TRF), fluorescence polarization (FP), fluorescence recovery after photobleaching (FRAP), fluorescence activated cell sorting (FACS), fluorescence correlation spectroscopy (FCS), etc. Excitation and emission wavelength, fluorescence quantum yield, fluorescence lifetime, size, photostability, and biological functionality are important factors to be considered in selection of a desired fluorescent probe for your applications. Besides

the fluorescence instrument discussed above, fluorescent reagents are the most critical factor in the successful use of fluorescence technologies. There are several factors that need to be considered in selection of appropriate fluorescent reagents for your assays.

- *Functionality:* There are two classes of fluorescent probes used in biological assays. Reactive fluorescent dyes are used to label target biomolecules such as antibodies, avidins, nucleotides, and peptides for tracing biochemical processes. Nonreactive fluorescent dyes are used to track biological events through their fluorescence changes that respond to the biological events of interest. Fluorescence changes are measured in three essential modes: fluorescence intensity, fluorescence lifetime, and fluorescence polarization. Fluorescence intensity measurement is still the predominant mode although measurements of fluorescence polarization and fluorescence lifetime get more attentions in recent years.

- *Excitation and Emission Wavelength:* There are many factors to be considered in selection of appropriate excitation and emission wavelengths, e.g., the light source and filters of the fluorescence instrument used, and the absorption and emission of undesired impurities in the analyte. In general, longer wavelengths tend to give better sensitivity.
  "Note that most excitation and emission maxima given in the tables in this brochure are determined in ethanol, DMSO, or DMF and may differ from values determined in other solvents. However, in most cases the difference will be negligible."

- *Band Shape and Width:* The shape of the excitation and emission spectra is an important component in multiplexing applications. For organic dyes, both excitation and emission spectra usually have multiple peaks or shoulders as well as gradually diminishing tails to the red of the last peak. Inorganic materials (such as lanthanide complexes and quantum dots) display extremely symmetrical and narrow spectra that are very useful for multiplexing applications.

- *Stokes Shift:* The Stokes shift is the difference between the absorption peak and the emission peak for fluorophores. Larger Stokes shift is always preferred as long as other properties of fluorescent probes are not compromised. Larger Stokes shift allows the use of broad excitation and emission filters that do not overlap, which increases brightness and sensitivity. Fluorescent probes of smaller Stokes shift requires filters that are very close together and do not include the entire area of the curves, thus reducing efficiency and brightness.

- *Photostability:* Many chemical processes lead to the degradation of the emission from conventional dyes. Photooxidation is the primary cause of photobleaching. There are two ways to reduce photobleaching: selecting more photostable fluorescent reagents or adding anti-oxidants (in the assay systems). For example, rhodamines are preferred over fluoresceins for photostability reason. In general, microscopic assays require more stringent photostability than microplate or flow cytometry- based assays.

Other more specific effects associated with a specific application will be discussed in the following chapters. These factors include pH effect, environment effect, ion effect, enzyme action, and receptor binding.

1.5 Critical factors in designing fluorescence-based assays

As discussed above, there are many factors that have significant effects on both fluorescence instruments and fluorescent probes. Besides these instrumentation and reagent effects, there are quite a few assay conditions that need to be carefully controlled to give the best assay results.

- *Linearity and Dynamic Range:* Fluorescence intensity is theoretically proportional (linear) to concentration. There are, however, factors that affect this linear relationship. When concentration is too high, light cannot pass through the sample to cause excitation. Thus very high concentrations can have very low fluorescence intensity (concentration quenching). The linearity of a sample is related to many factors, including the chemical composition of the sample and the path length the light must travel. An unknown sample should always be tested for linearity.

- *Fluorescence Quenching:* The term "quenching" refers to many factors that reduce, or quench fluorescence. Quenching factors are one reason why it is very important to treat standards, blanks and samples in exactly the same manner.

- *Solution Turbidity:* Fluorescence measurements are significantly more immune to the effects of turbidity compared to absorption techniques like UV/VIS spectrophotometers. If the interfering substance is reflective, turbidity can create light scattering and readings will increase. If the interfering substance absorbs light, fluorescence will be reduced. If the interfering substance does not absorb light, however, the fluorescence readings will not be affected unless there is so much turbidity that the emitted light cannot penetrate the solvent.

- *pH Effect:* Fluorescence of many compounds is pH-sensitive. We recommend that buffers should be always used in your assays. In certain studies, pH factors can be an advantage. The pH dependence of probe molecules has been greatly used to determine the pH of cells and other biological systems.

- *Photobleaching:* Many fluorescent molecules can be bleached or destroyed by light. Ultraviolet light, especially, can cause certain molecules to break down. Fluorescence readings decrease as the molecules are destroyed. Rate of destruction varies depending upon environmental factors, including temperature.

- *Temperature:* Fluorescence is affected by changes in temperature. As temperature increases, fluorescence decreases. This might be due to an increase of molecular motion with increasing temperature, which results in more molecular collisions and subsequent loss of energy. However, for most fluorescent compounds the magnitude of temperature effect is much smaller than other effects described above.

For labeling probes and research chemicals not included in this brochure, for example, phalloidins or lipophilic stains, please visit our website www.mobitec.com or contact us directly at info@mobitec.com.

2. Fluorescence Reference Standards

The fluorescence reference standards listed below are manufactured by AnaSpec, USA. They are carefully chosen and purified, and are guaranteed to give the same correct fluorescence spectra from batch to batch. The AnaStandard Fluorescence Instrument Calibration Kit (catalog # 80605AS) contains a set of stable and water-soluble dyes to cover the full fluorescence spectrum.

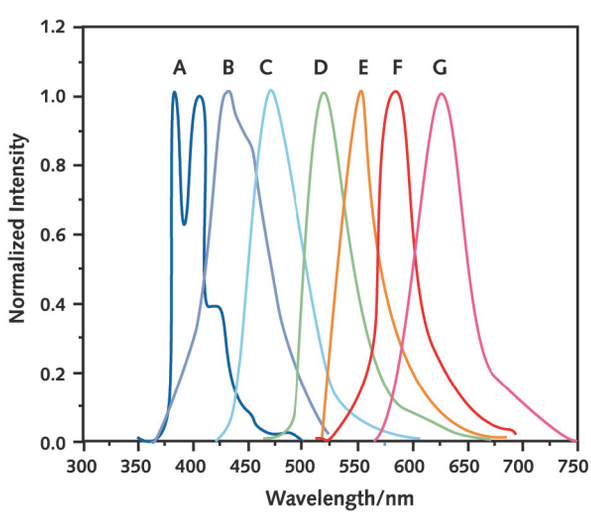


Figure 2. Normalized fluorescence spectra of the dyes used in the AnaStandard™ fluorescence instrument calibration kit

Fluorescence reference standards

Order #	Product	Ex/Em (nm)	Amount
80040AS	Quinine sulfate Dihydrate *Fluorescence Reference Standard	348/455	100 mg
80014AS	Coumarin 152 *Fluorescence Reference Standard*	397/510	100 mg
80002AS	3-Cyano-7-hydroxycoumarin *Fluorescence Reference Standard*	408/450	100 mg
80001AS	Fluorescein *Fluorescence Reference Standard*	490/514	1 g
80025AS	Sulfofluorescein *Fluorescence Reference Standard*	495/520	100 mg
80023AS	Fluorescein, disodium salt *Fluorescence Reference Standard*	500/521	100 mg
80015AS	Rhodamine 110 *Fluorescence Reference Standard*	510/535	100 mg
80024AS	2,7-Dichlorofluorescein *Fluorescence Reference Standard*	512/530	100 mg
80007AS	Rhodamine 6G *Fluorescence Reference Standard*	530/556	100 mg
80005AS	Tetramethylrhodamine *Fluorescence Reference Standard*	540/566	100 mg
80030AS	Rhodamine B *Fluorescence Reference Standard*	552/588	100 mg
80026AS	Nile Red *Fluorescence Reference Standard*	552/636	25 mg
80009AS	Sulforhodamine B *Fluorescence Reference Standard*	556/575	1 g
80003AS	Resorufin, sodium salt *Fluorescence Reference Standard*	571/585	100 mg
80010AS	Sulforhodamine 101 *Fluorescence Reference Standard*	586/605	100 mg
80008AS	Cresyl violet *Fluorescence Reference Standard*	601/632	100 mg
80011AS	Nile Blue A *Fluorescence Reference Standard*	633/672	100 mg
80028AS	Oxazine 1 *Fluorescence Reference Standard*	646/670	25 mg
80027AS	Rhodamine 700 *Fluorescence Reference Standard*	647/673	25 mg
80029AS	Rhodamine 800 *Fluorescence Reference Standard*	676/704	25 mg
80605AS	AnaStandard™ Fluorescence Assay Calibration Kit *Full Spectrum*	350-650/400-700	1 kit

3. Reactive Fluorescent Dyes

Reactive fluorescent dyes are widely used to modify amino acids, peptides, proteins (in particular, antibodies), oligonucleotides, nucleic acids, carbohydrates, and other biological molecules. Among the reactive dyes, amine-reactive dyes are most often used to prepare various bioconjugates for immunochemistry, histochemistry, fluorescence in situ hybridization (FISH), cell tracing, receptor binding, and other biological applications since amino groups are either abundant or easily introduced into biomolecules. In general, thiol-reactive reagents are frequently used to develop probes for investigating some particular protein structures and functions. Additionally, some amine-containing fluorescent reagents are also used to modify biomolecules, in particular to label glycoproteins. Compared to amino and thiol groups, hydroxyl and carboxyl groups are less frequently used to label biopolymers.

3.1 Amine-reactive dyes

A number of fluorescent amine-reactive dyes have been developed to label various biomolecules, and the resultant conjugates are widely used in biological applications. There are four major classes of reactive fluorescent reagents used to label amines: succinimidyl esters (SE), isothiocyanates (ITC), sulfonyl chlorides (SC), and electron-deficient aryl halides. We offer all the popular amine-reactive fluorescent dyes for peptide/protein labelings, nucleotide modifications, and microarray applications.

In general, the preferred bioconjugates should have high fluorescence quantum yields and retain the biological activities of the unlabeled biomolecules. It is quite critical to properly control the degree of substitution (DOS) when conducting a conjugation reaction of biopolymers. A high degree of labeling may significantly decrease the water solubility and binding affinity/specificity of the target biomolecules. Although conjugating dyes to biomolecules is usually easy, preparing the optimal conjugate may require extensive experimentation.

There are four important factors that need to be considered when designing an amine-linked conjugation reaction:

- *Solvents:* For the most part, reactive dyes and haptens are hydrophobic molecules and should be dissolved in anhydrous dimethylformamide (DMF) or dimethylsulfoxide (DMSO). It has been reported that DMSO reacts with sulfonyl chloride, thus it should not be used with sulfonyl chlorides.

- *Reaction pH:* The labeling reactions of amines with succinimidyl esters, Isothiocyanates, and other reagents are strongly pH dependent. Amine-reactive reagents react with non-protonated aliphatic amine groups, including the terminal amines of proteins and the ε-amino groups of lysines. Thus,

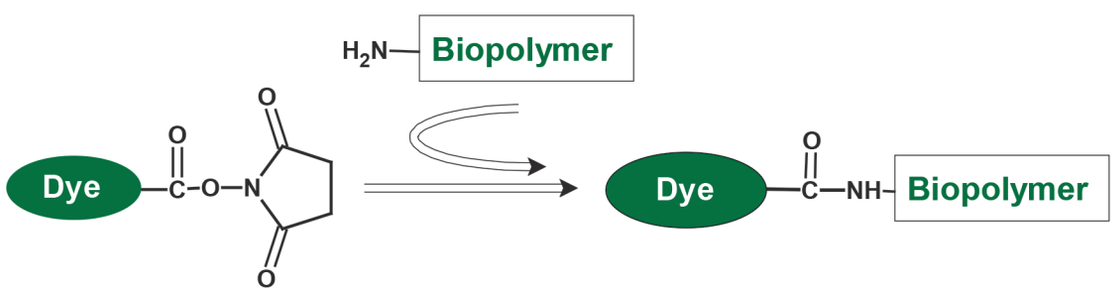
amine acylation reactions are usually carried out above pH 7.5. On the other hand, the acylation reagents tend to hydrolyze in the presence of water, with the rate increasing as the pH increases.

- Thus, protein conjugations are often run in carbonate buffers with a pH ranging from 7.5 to 10.0. A pH of 8.5-9.5 is usually optimal for modifying lysine residues. In contrast, the α-amino group at a protein's N-terminus can sometimes be selectively modified by reaction at a slightly basic pH. Protein modifications by succinimidyl esters can typically be done at pH 7.5-8.5, whereas isothiocyanates may require a pH 9.0-10.0 for optimal conjugations.

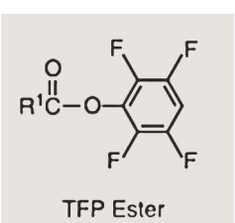
- *Reaction Buffers:* Buffers that contain free amines such as Tris and glycine must be avoided when using an amine-reactive reagent. Ammonium salts (such as ammonium sulfate and ammonium acetate) that are widely used for protein precipitation must also be removed before performing dye conjugations. High concentrations of nucleophilic thiol compounds should also be avoided because they may react with the labeling reagent to form unstable intermediates that could destroy the reactive dye.

- *Reaction Temperature:* Most conjugations are done at room temperature. However, either elevated or reduced temperature may be required for a particular labeling reaction.

Carboxylic acids and their succinimidyl esters



Succinimidyl esters are proven to be the best reagents for amine modifications because the amide bonds that are formed are essentially identical to, and as stable as peptide bonds. These reagents are generally stable if they are properly stored, and show good reactivity and selectivity with aliphatic amines. They have very low reactivity with aromatic amines, alcohols, phenols (including tyrosine) and histidine. Some succinimidyl esters have poor water solubility, and may not be readily used with a specific application. To overcome this limitation, sulfosuccinimidyl esters (SSE) can generally be prepared *in situ* from the corresponding carboxylic acids simply by dissolving the carboxylic acid dyes in a buffer that contains *N*-hydroxysulfosuccinimide (NHSS) and 1- ethyl-3-(3 dimethylaminopropyl)carbo-diimide (EDC). Addition of NHSS to the buffer has been shown to enhance the yield of carbodiimide-mediated conjugations.7 It was found that some *N*-hydroxysuccinimide (NHS) uronium salts can also be used to convert carboxylic acids to the corresponding succinimidyl esters *in situ* for conjugation reactions. The carboxylic acid derivatives may also be useful for preparing acid chlorides and anhydrides, which, unlike succinimidyl esters, can be used to modify aromatic amines and alcohols.

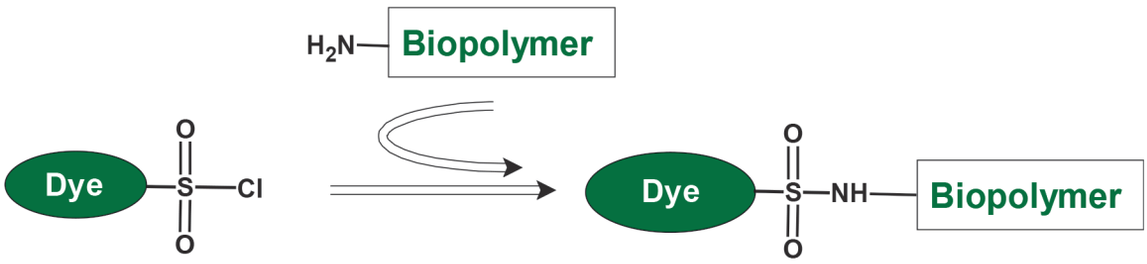


TFP Ester

TFP ester

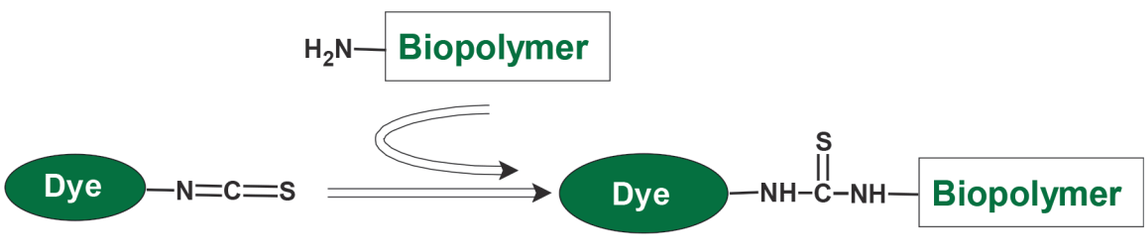
Tetrafluorophenyl (TFP) esters are an improvement over the succinimidyl ester (SE or NHS-ester) chemistry typically used to attach fluorophores or haptens to the primary amines of biomolecules. Both reactive chemistries produce the same strong amide bond between the dye or hapten and the compound of interest, but TFP esters are less susceptible to spontaneous hydrolysis during conjugation reactions.

Sulfonyl chlorides



Sulfonyl chlorides, including Dansyl chloride, Lissamine™ rhodamine B sulfonyl chloride, and sulforhodamine 101 sulfonyl chloride (also known as Texas Red®) are highly reactive. These reagents are unstable in water, especially at the higher pH required for reaction with aliphatic amines. Protein modifications by sulfonyl chlorides need to be carefully carried out preferably at low temperature. Sulfonyl chlorides can also react with phenols (including tyrosine), aliphatic alcohols (including polysaccharides), thiols (such as cysteine), and imidazoles (such as histidine), but these reactions are not common in proteins or in aqueous solution. Sulfonyl chlorides are unstable in dimethylsulfoxide (DMSO) and should never be used in this solvent.

Isothiocyanates



Isothiocyanates form thioureas upon reaction with amines. Studies indicated that some thiourea products (in particular, the conjugates from α-amino acids/peptides/proteins) are much less stable than the conjugates that are prepared from the corresponding succinimidyl esters. It has been reported that antibody conjugates prepared from fluorescein isothiocyanates deteriorate over time. Thus, only a few popular isothiocyanates are offered: 5- and 6-fluorescein isothiocyanates (FITC) that are still widely used for preparing fluorescent antibody conjugates primarily due to their low costs. However, we strongly recommend using 5-FAM, SE, when necessary, for your conjugations whenever possible.

Order#	Product	Ex/Em (nm)	Amount
21109AS	Biotin, SE (Biotin-OSu)	N/A	0.1 g
60640AS	Biotin-XX, SE	N/A	25 mg
21113AS	Biotin-LC, SE (Biotin-LC-OSu)	N/A	0.1 g
21110AS	Biotin, SE (Biotin-OSu)	N/A	0.5 g
21114AS	Biotin-LC, SE (Biotin-LC-OSu)	N/A	0.5 g
81228AS	DNP-X acid, SE	350/none	25 mg
81801AS	Dabcyl acid, SE	453/none	100 mg
81804AS	Dabcyl Plus™ acid, SE	454/none	25 mg
81826-5AS	QXL™ 490 acid, SE	495/none	5 mg
81836-5AS	QXL™ 570 acid, SE	578/none	5 mg
81816-5AS	QXL™ 610 acid, SE	628/none	5 mg
MFP-D660-01-1	MFP™-DYQ-660-NHS-Ester	660/none	1 mg
81841AS	QXL™ 670 acid, SE	668/none	5 mg
81851AS	QXL™ 680 acid, SE	679/none	5 mg
81214AS	Dansyl-X, SE	333/518	25 mg
MFPCCFA-030-1	MFP-Eterneon™-350/430 NHS	350/430	1 mg
MFPCCFA-030-5	MFP-Eterneon™-350/430 NHS	350/430	5 mg
MFPCCFA-030-10	MFP-Eterneon™-350/430 NHS	350/430	10 mg
MFPCCFA-031-1	MFP-Eterneon™-350/455 NHS	350/455	1 mg
MFPCCFA-031-5	MFP-Eterneon™-350/455 NHS	350/455	5 mg
MFPCCFA-031-10	MFP-Eterneon™-350/455 NHS	350/455	10 mg
MFP-D350-06-1	MFP™-DY-350-TFP-Ester	353/432	1 mg
MFP-D350-01-1	MFP™-DY-350-NHS-Ester	353/432	1 mg
81208AS	AMCA-X, SE	353/442	10 mg
81226AS	DMACA, SE	376/468	25 mg

MFPCCFA-032-1	MFP-Eterneon™-384/480 NHS	384/480	1 mg
MFPCCFA-032-5	MFP-Eterneon™-384/480 NHS	384/480	5 mg
MFPCCFA-032-10	MFP-Eterneon™-384/480 NHS	384/480	10 mg
MFPCCFA-033-1	MFP-Eterneon™-393/523 NHS	393/523	1 mg
MFPCCFA-033-5	MFP-Eterneon™-393/523 NHS	393/523	5 mg
MFPCCFA-033-10	MFP-Eterneon™-393/523 NHS	393/523	10 mg
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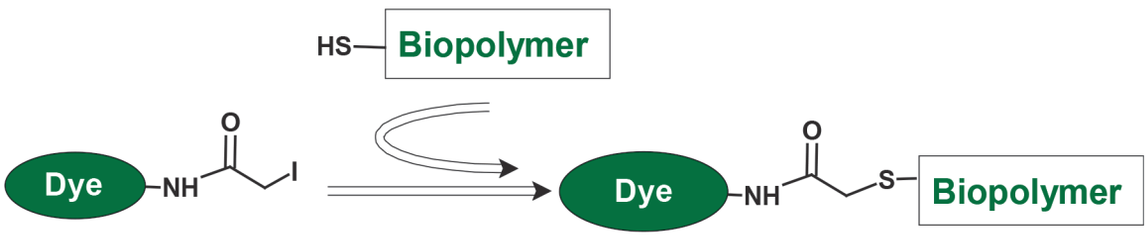
MFPCCFA-034-5	MFP-Eterneon™-394/507 NHS	394/507	5 mg
MFPCCFA-034-10	MFP-Eterneon™-394/507 NHS	394/507	10 mg
MFP-D405-06-1	MFP™-DY-405-TFP-Ester	400/423	1 mg
MFP-D405-01-1	MFP™-DY-405-NHS-Ester	400/423	1 mg
81216AS	DACITC	400/476	10 mg
89317-1AS	HiLyte Fluor™ 405 acid, SE	404/428	1 mg
MFP-D415-01-1	MFP™-DY-415-NHS-Ester	418/467	1 mg
81211AS	DEAC, SE [7-Diethylaminocoumarin-3-carboxylic acid, SE]	432/472	25 mg
81213AS	NBD-X, SE	466/535	25 mg
MFPCCFA-035-1	MFP-Eterneon™-480/635 NHS	480/635	1 mg
MFPCCFA-035-5	MFP-Eterneon™-480/635 NHS	480/635	5 mg
MFPCCFA-035-10	MFP-Eterneon™-480/635 NHS	480/635	10 mg
MFP-D485XL-01-1	MFP™-DY-485XL-NHS-Ester	485/560	1 mg
MFP-D490-06-1	MFP™-DY-490-TFP-Ester	491/515	1 mg
MFP-D490-01-1	MFP™-DY-490-NHS-Ester	491/515	1 mg
89000AS	5(6)-CFDA, SE	492/517	25 mg
81007AS	5-FAM, SE	492/518	10 mg
81007-100AS	5-FAM, SE	492/518	100 mg
81007-1000AS	5-FAM, SE	492/518	1 g
MFP-D495-X5-01-1	MFP™-DY-495-X5-NHS-Ester	493/521	5 mg
81005AS	5-FITC	494/519	100 mg
81006AS	5(6)-FAM, SE	494/519	25 mg
81006-100AS	5(6)-FAM, SE	494/519	100 mg
20151AS	5-FITC	494/519	1 g
81006-1000AS	5(6)-FAM, SE	494/519	1 g
81010AS	6-FITC	494/520	100 mg
81009AS	5-FAM-X, SE	494/521	5 mg
81008AS	6-FAM, SE	495/517	10 mg
81008-100AS	6-FAM, SE	495/517	100 mg
81134AS	5(6)-CR110, SE	498/521	5 mg
81135AS	5-CR110, SE	498/521	5 mg
81136AS	6-CR110, SE	498/521	5 mg
MFP-D480XL-01-1	MFP™-DY-480XL-NHS-Ester	500/630	1 mg
MFP-A2000	MFP488-NHS-Ester	501/523	1 mg
81161-1AS	HiLyte Fluor™ 488 acid, SE	502/527	1 mg
81161AS	HiLyte Fluor™ 488 acid, SE	502/527	5 mg
MFP-D505-X5-01-1	MFP™-DY-505-X5-NHS-ester	505/530	5 mg
MFP-D510XL-01-1	MFP™-DY-510XL-NHS-Ester	509/590	1 mg
MFP-D481XL-01-1	MFP™-DY-481XL-NHS-Ester	515/650	1 mg
81011AS	6-JOE, SE	520/548	5 mg
MFP-D520XL-01-1	MFP™-DY-520XL-NHS-Ester	520/664	1 mg
81022AS	6-TET, SE	521/536	5 mg
81104AS	5(6)-CR6G, SE	522/550	10 mg
MFP-D521XL-01-1	MFP™-DY-521XL-NHS-Ester	523/668	1 mg
81106AS	6-CR6G, SE	524/551	5 mg
81105AS	5-CR6G, SE	524/556	5 mg
81020AS	6-HEX, SE	533/550	5 mg
MFP-D530-01-1	MFP™-DY-530-NHS-Ester	539/561	1 mg
81150AS	5(6)-TRITC	543/571	10 mg
81151AS	5-TRITC, G isomer	543/571	5 mg
81127AS	5(6)-TAMRA-X, SE	544/572	5 mg
81124AS	5(6)-TAMRA, SE	546/575	25 mg
81124-01AS	5(6)-TAMRA, SE	546/575	100 mg
MFP-D555-01-1	MFP™-DY-555-NHS-Ester	547/572	1 mg
MFP-A2009	MFP555 NHS-Ester	547/572	1 mg
81126AS	6-TAMRA, SE	547/573	5 mg
81126-1AS	6-TAMRA, SE	547/573	1 g
81125AS	5-TAMRA, SE	547/574	5 mg
81125-01AS	5-TAMRA, SE	547/574	100 mg
MFP-D556-01-1	MFP™-DY-556-NHS-Ester	548/573	1 mg
MFP-D554-01-1	MFP™-DY-554-NHS-Ester	551/572	1 mg
81251AS	HiLyte Fluor™ 555 acid, SE	552/569	1 mg
MFP-D550-01-1	MFP™-DY-550-NHS-Ester	553/578	1 mg
MFP-D560-01-1	MFP™-DY-560-NHS-Ester	559/578	1 mg
MFP-D549P1-06-1	MFP™-DY-549P1-TFP-Ester	560/575	1 mg
MFP-D547P1-01-1	MFP™-DY-547P1-NHS-Ester	560/575	1 mg
MFP-D549P1-01-1	MFP™-DY-549P1-NHS-Ester	560/575	1 mg
81108AS	LRB-SC (Lissamine Rhodamine B sulfonyl chloride)	568/584	100 mg

81114AS	5-ROX, SE	573/602	5 mg
81115AS	6-ROX, SE	575/602	5 mg
81113AS	5(6)-ROX, SE	576/601	25 mg
MFP-D590-01-1	MFP™-DY-590-NHS-Ester	580/599	1 mg
MFP-D591-01-1	MFP™-DY-591-NHS-Ester	581/598	1 mg
81130AS	Sulforhodamine 101 sulfonyl chloride	588/601	10 mg
81272-1AS	HiLyte Fluor™ 594 acid, SE	593/616	1 mg
81272-5AS	HiLyte Fluor™ 594 acid, SE	593/616	5 mg
MFP-D594-06-1	MFP™-DY-594-TFP-Ester	594/615	1 mg
MFP-D594-01-1	MFP™-DY-594-NHS-Ester	594/615	1 mg
MFP-A2004	MFP590 NHS-Ester	597/624	1 mg
MFP-D605-01-1	MFP™-DY-605-NHS-Ester	600/624	1 mg
MFP-D610-01-1	MFP™-DY-610-NHS-Ester	610/630	1 mg
MFP-D615-01-1	MFP™-DY-615-NHS-Ester	621/641	1 mg
MFP-D634-06-1	MFP™-DY-634-TFP-Ester	635/658	1 mg
MFP-D634-01-1	MFP™-DY-634-NHS-Ester	635/658	1 mg
MFP-D630-01-1	MFP™-DY-630-NHS-Ester	636/657	1 mg
MFP-D632-01-1	MFP™-DY-632-NHS-Ester	637/657	1 mg
MFP-D633-01-1	MFP™-DY-633-NHS-Ester	637/657	1 mg
MFP-D631-01-1	MFP™-DY-631-NHS-Ester	637/658	1 mg
MFP-A2005	MFP631-NHS-Ester	637/658	1 mg
MFP-D636-01-1	MFP™-DY-636-NHS-Ester	645/671	1 mg
MFP-D635-01-1	MFP™-DY-635-NHS-Ester	647/671	1 mg
81256AS	HiLyte Fluor™ 647 acid, SE	649/674	1 mg
MFP-D647P1-01-1	MFP™-DY-647P1-NHS-Ester	653/672	1 mg
MFP-D648P1-01-1	MFP™-DY-648P1-NHS-Ester	653/672	1 mg
MFP-D650-01-1	MFP™-DY-650-NHS-Ester	653/674	1 mg
MFP-D654-01-1	MFP™-DY-654-NHS-Ester	653/677	1 mg
MFP-D652-01-1	MFP™-DY-652-NHS-Ester	654/675	1 mg
MFP-D649P1-06-1	MFP™-DY-649P1-TFP-Ester	655/676	1 mg
MFP-D649P1-01-1	MFP™-DY-649P1-NHS-Ester	655/676	1 mg
MFP-D651-01-1	MFP™-DY-651-NHS-Ester	656/678	1 mg
MFP-D677-01-1	MFP™-DY-677-NHS-Ester	673/694	1 mg
MFP-D678-01-1	MFP™-DY-678-NHS-Ester	674/694	1 mg
MFP-D675-01-1	MFP™-DY-675-NHS-Ester	674/699	1 mg
MFP-D676-01-1	MFP™-DY-676-NHS-Ester	674/699	1 mg
81261AS	HiLyte Fluor™ 680 acid, SE	678/699	1 mg
MFP-D679P1-01-1	MFP™-DY-679P1-NHS-Ester	679/697	1 mg
MFP-D682-06-1	MFP™-DY-682-TFP-Ester	690/709	1 mg
MFP-D680-01-1	MFP™-DY-680-NHS-Ester	690/709	1 mg
MFP-D682-01-1	MFP™-DY-682-NHS-Ester	690/709	1 mg
MFP-D681-01-1	MFP™-DY-681-NHS-Ester	691/708	1 mg
MFP-D703-01-1	MFP™-DY-703-NHS-Ester	705/721	1 mg
MFP-D704-01-1	MFP™-DY-704-NHS-Ester	706/721	1 mg
MFP-D701-01-1	MFP™-DY-701-NHS-Ester	706/731	1 mg
MFP-D700-01-1	MFP™-DY-700-NHS-Ester	707/730	1 mg
MFP-D730-01-1	MFP™-DY-730-NHS-Ester	732/758	1 mg
MFP-D732-01-1	MFP™-DY-732-NHS-Ester	736/759	1 mg
MFP-D734-01-1	MFP™-DY-734-NHS-Ester	736/759	1 mg
MFP-D731-01-1	MFP™-DY-731-NHS-Ester	736/760	1 mg
MFP-D750-01-1	MFP™-DY-750-NHS-Ester	747/776	1 mg
MFP-D754-01-1	MFP™-DY-754-NHS-Ester	748/771	1 mg
MFP-D752-01-1	MFP™-DY-752-NHS-Ester	748/772	1 mg
MFP-D751-01-1	MFP™-DY-751-NHS-Ester	751/779	1 mg
81266AS	HiLyte Fluor™ 750 acid, SE	754/778	1 mg
MFP-D749P1-01-1	MFP™-DY-749P1-NHS-Ester	759/780	1 mg
MFP-D778-01-1	MFP™-DY-778-NHS-Ester	767/787	1 mg
MFP-D777-01-1	MFP™-DY-777-NHS-Ester	770/788	1 mg
MFP-D776-06-1	MFP™-DY-776-TFP-Ester	771/793	1 mg
MFP-D776-01-1	MFP™-DY-776-NHS-Ester	771/793	1 mg
MFP-D800-06-1	MFP™-DY-800-TFP-Ester	777/791	1 mg
MFP-D800-01-1	MFP™-DY-800-NHS-Ester	777/791	1 mg
MFP-D780-01-1	MFP™-DY-780-NHS-Ester	782/800	1 mg
MFP-D781-01-1	MFP™-DY-781-NHS-Ester	783/800	1 mg
MFP-D782-01-1	MFP™-DY-782-NHS-Ester	783/800	1 mg
MFP-D831-01-1	MFP™-DY-831-NHS-Ester	844/875	1 mg

3.2 Thiol-reactive dyes

Because free thiol (SH) groups, also called mercapto groups, are not present as abundantly as amino groups in most biopolymers such as proteins and nucleic acids, thiol-reactive reagents often provide a means of selectively modifying a protein at a defined site. Therefore thiol-reactive dyes are often used to prepare fluorescent peptides, proteins and oligonucleotides for probing biological structures, functions and interactions. Thiol-reactive dyes have been used to develop probes for analyzing the topography of proteins in biological membranes, determining distances within the protein or between the proteins and monitoring the changes in protein conformation using environment-sensitive probes.



There are many types of thiol-reactive dyes reported in the literature, including iodoacetamides, disulfides, maleimides, vinyl sulfones and various electron-deficient aryl halides and sulfonates. Iodoacetamides and maleimides are by far the most popular thiol-reactive moieties. Iodoacetamides and maleimides readily react with thiol moieties of biopolymers to form thioether conjugates. The thioether bond formed is quite stable. Additionally, iodoacetamides and maleimides have good selectivity to thiol groups. However, they may also react with histidine or potentially tyrosine under higher pH if free thiols are not readily available. Iodo compounds are known to be very light-sensitive, especially in solution. Thus, we recommend the reactions of iodoacetamides with biomolecules should be carried out under subdued light. The bioconjugation reactions of thiol-reactive probes can be quenched by the addition of cysteine, glutathione, or mercaptosuccinic acid to the reaction mixture, forming highly water-soluble adducts that are easily removed by dialysis or gel filtration.

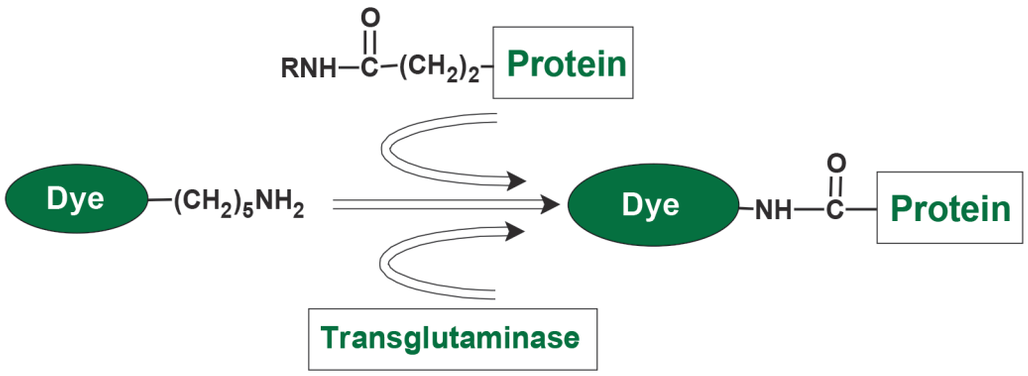
Order#	Product	Ex/Em (nm)	Amount
60643AS	Biotin C2 maleimide	NA/NA	25 mg
60644AS	N-(Biotinoyl)-N''-(iodoacetyl)ethylenediamine	NA/NA	25 mg
81822AS	DNP C2 maleimide	350/none	25 mg
81838AS	QXL™ 570 C2 maleimide	577/none	5 mg
MFP-D660-03-2	MFP™-DYQ-660-maleimide	660/none	1 mg
81854AS	QXL™ 680 C2 maleimide	679/none	1 mg
81431AS	EDANS Iodoacetamide	336/490	100 mg
81432AS	EDANS C2 maleimide	336/490	25 mg
81436AS	N-(1-Pyrene)maleimide	338/375	100 mg
MFP-D350-03-2	MFP™-DY-350-maleimide	353/432	1 mg
81402AS	DACIA	376/465	10 mg
81403AS	DACM	383/463	10 mg
81422AS	DCIA	384/470	25 mg
MFP-D405-03-2	MFP™-DY-405-maleimide	400/423	1 mg
89320AS	HiLyte Fluor™ 405 C2 maleimide	404/428	1 mg
MFP-D415-03-2	MFP™-DY-415-maleimide	418/467	1 mg
81407AS	6-IAF	483/517	25 mg
MFP-D485XL-03-2	MFP™-DY-485XL-maleimide	485/560	1 mg
MFP-D490-03-2	MFP™-DY-490-maleimide	491/515	1 mg
81406AS	5-IAF	492/515	25 mg
81405AS	Fluorescein-5-maleimide	493/515	25 mg
MFP-D495-X5-03-2	MFP™-DY-495-X5-maleimide	493/521	5 mg
MFP-D480XL-03-2	MFP™-DY-480XL-maleimide	500/630	1 mg
MFP-A1254	MFP488-C5-maleimide	501/523	1 mg
81164AS	HiLyte Fluor™ 488 C2 maleimide	502/527	1 mg
MFP-D505-X5-03-2	MFP™-DY-505-X5-maleimide	505/530	1 mg
MFP-D510XL-03-2	MFP™-DY-510XL-maleimide	509/590	1 mg
MFP-D481XL-03-2	MFP™-DY-481XL-maleimide	515/650	1 mg
MFP-D520XL-03-2	MFP™-DY-520XL-maleimide	520/664	1 mg
MFP-D521XL-03-2	MFP™-DY-521XL-maleimide	523/668	1 mg
MFP-D530-03-2	MFP™-DY-530-maleimide	539/561	1 mg
81444AS	Tetramethylrhodamine-5-(and-6)-maleimide	540/567	25 mg
81446AS	Tetramethylrhodamine-5-maleimide	540/567	5 mg
81410AS	5-TMRIA	541/567	5 mg
81445AS	Tetramethylrhodamine-6-maleimide	542/568	5 mg
81441-5AS	Tetramethylrhodamine-5-(and-6) C2 maleimide	544/572	5 mg
81441-25AS	Tetramethylrhodamine-5-(and-6) C2 maleimide	544/572	25 mg

81442AS	Tetramethylrhodamine-6 C2 maleimide	544/572	5 mg
81443AS	Tetramethylrhodamine-5 C2 maleimide	544/572	5 mg
MFP-D555-03-2	MFP™-DY-555-maleimide	547/572	1 mg
MFP-D554-03-2	MFP™-DY-554-maleimide	551/572	1 mg
81254AS	HiLyte Fluor™ 555 C2 maleimide	552/569	1 mg
MFP-D550-03-2	MFP™-DY-550-maleimide	553/578	1 mg
MFP-D560-03-2	MFP™-DY-560-maleimide	559/578	1 mg
MFP-D549P1-03-2	MFP™-DY-549P1-maleimide	560/575	1 mg
MFP-D590-03-2	MFP™-DY-590-maleimide	580/599	1 mg
MFP-D591-03-2	MFP™-DY-591-maleimide	581/598	1 mg
81447AS	Sulforhodamine 101 C2 maleimide	588/601	5 mg
81275AS	HiLyte Fluor™ 594 C2 maleimide	593/616	1 mg
MFP-D594-03-2	MFP™-DY-594-maleimide	594/615	1 mg
MFP-D610-03-2	MFP™-DY-610-maleimide	610/630	1 mg
MFP-D615-03-2	MFP™-DY-615-maleimide	621/641	1 mg
MFP-D634-03-2	MFP™-DY-634-maleimide	635/658	1 mg
MFP-D630-03-2	MFP™-DY-630-maleimide	636/657	1 mg
MFP-D632-03-2	MFP™-DY-632-maleimide	637/657	1 mg
MFP-D633-03-2	MFP™-DY-633-maleimide	637/657	1 mg
MFP-D631-03-2	MFP™-DY-631-maleimide	637/658	1 mg
MFP-D636-03-2	MFP™-DY-636-maleimide	645/671	1 mg
MFP-D635-03-2	MFP™-DY-635-maleimide	647/671	1 mg
81259AS	HiLyte Fluor™ 647 C2 maleimide	649/674	1 mg
MFP-D647P1-03-2	MFP™-DY-647P1-maleimide	653/672	1 mg
MFP-D650-03-2	MFP™-DY-650-maleimide	653/674	1 mg
MFP-D654-03-2	MFP™-DY-654-maleimide	653/677	1 mg
MFP-D652-03-2	MFP™-DY-652-maleimide	654/675	1 mg
MFP-D649P1-03-2	MFP™-DY-649P1-maleimide	655/676	1 mg
MFP-D651-03-2	MFP™-DY-651-maleimide	656/678	1 mg
MFP-D677-03-2	MFP™-DY-677-maleimide	673/694	1 mg
MFP-D675-03-2	MFP™-DY-675-maleimide	674/699	1 mg
MFP-D676-03-2	MFP™-DY-676-maleimide	674/699	1 mg
81264AS	HiLyte Fluor™ 680 C2 maleimide	678/699	1 mg
MFP-D679P1-03-2	MFP™-DY-679P1-maleimide	679/697	1 mg
MFP-D680-03-2	MFP™-DY-680-maleimide	690/709	1 mg
MFP-D682-03-2	MFP™-DY-682-maleimide	690/709	1 mg
MFP-D681-03-2	MFP™-DY-681-maleimide	691/708	1 mg
MFP-D704-03-2	MFP™-DY-704-maleimide	706/721	1 mg
MFP-D701-03-2	MFP™-DY-701-maleimide	706/731	1 mg
MFP-D700-03-2	MFP™-DY-700-maleimide	707/730	1 mg
MFP-D730-03-2	MFP™-DY-730-maleimide	732/758	1 mg
MFP-D732-03-2	MFP™-DY-732-maleimide	736/759	1 mg
MFP-D734-03-2	MFP™-DY-734-maleimide	736/759	1 mg
MFP-D731-03-2	MFP™-DY-731-maleimide	736/760	1 mg
MFP-D750-03-2	MFP™-DY-750-maleimide	747/776	1 mg
MFP-D754-03-2	MFP™-DY-754-maleimide	748/771	1 mg
MFP-D752-03-2	MFP™-DY-752-maleimide	748/772	1 mg
MFP-D751-03-2	MFP™-DY-751-maleimide	751/779	1 mg
81269AS	HiLyte Fluor™ 750 C2 maleimide	754/778	1 mg
MFP-D749P1-03-2	MFP™-DY-749P1-maleimide	759/780	1 mg
MFP-D778-03-2	MFP™-DY-778-maleimide	767/787	1 mg
MFP-D777-03-2	MFP™-DY-777-maleimide	770/788	1 mg
MFP-D776-03-2	MFP™-DY-776-maleimide	771/793	1 mg
MFP-D800-03-2	MFP™-DY-800-maleimide	777/791	1 mg
MFP-D780-03-2	MFP™-DY-780-maleimide	782/800	1 mg
MFP-D781-03-2	MFP™-DY-781-maleimide	783/800	1 mg
MFP-D782-03-2	MFP™-DY-782-maleimide	783/800	1 mg
MFP-D831-03-2	MFP™-DY-831-maleimide	844/875	1 mg
MFP-D831-03-2	MFP™-DY-831-maleimide	844/875	1 mg

3.2 Amine-containing dyes and their applications

Amine-containing dyes are widely used to modify water-soluble biopolymers (such as proteins) using water-soluble carbodiimides (such as EDC) to convert the carboxyl groups of the biopolymers into amide groups. Either NHS or NHSS may be used to improve the coupling efficiency of EDC-mediated protein–carboxylic acid conjugations. A large excess of the amine-containing dyes is usually used for EDC-mediated bioconjugations in concentrated protein solutions at low pH to reduce intra- and inter-protein coupling to lysine residues, a common side reaction. These dyes can also be used for modifications of carbohydrates, glycoproteins, and nucleic acids that are first periodate-oxidized to introduce aldehydes and ketones into the biopolymers for subsequent reductive amination. The combination of periodate oxidation with reductive

amination provides an effective way for site-selective modifications of biopolymers. For example, periodate oxidation of the 3'-terminal ribose is reported to be one of the few methods of selectively modifying RNA. Periodate-oxidized ribonucleotides are converted to fluorescent nucleotide probes by reaction with fluorescent hydrazines and amines.



The transglutaminase-catalyzed transamidation of glutamine residues in some proteins and peptides has been recently used for selective modifications of peptides and proteins by amine-containing probes. In the transamidation, the amino group of certain glutamine residues is replaced with an aliphatic amine to form a labeled glutamine amide. This unique method for selective protein modification requires formation of a complex consisting of the glutamine residue, the aliphatic amine probe and the enzyme. Cadaverine (see 3.4) and lysine derivatives perform well in the assays of transglutaminase-catalyzed transamidation. Fluorescent cadaverine- and lysine-labeled dyes were successfully incorporated into peptides/proteins by the transamidation. The characteristic of impermeability of transglutaminase can be explored for selective cell surface labeling. The simultaneous use of a cell-impermeable dye or biotinylated aliphatic amine may further enhance the labeling selectivity. Dansyl cadaverine, the most popular transglutaminase substrate, was reported to selectively label erythrocyte band-3 protein while fluorescein cadaverine is used for labeling proteins of the extracellular matrix.

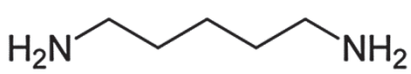
The amine-containing dyes are also valuable building blocks in bioorganic and medicinal chemistry. Amine-containing dyes were used to custom-synthesize many fluorescently labeled drugs, natural toxins and biological ligands.

Order#	Product	Ex/Em (nm)	Amount
81819AS	Dabcyl C2-aminomodified	428/none	100 mg
MFP-D660-02	MFP™-DYQ-660-Amino function	660/none	1 mg
81842AS	QXL™ 670 C2-aminomodified	668/none	5 mg
MFP-D350-02	MFP™-DY-350-Amino function	353/432	1 mg
MFP-D405-02	MFP™-DY-405-Amino function	400/423	1 mg
89318AS	HiLyte Fluor™ 405-aminomodified, TFA salt	404/428	1 mg
MFP-D415-02	MFP™-DY-415-Amino function	418/467	1 mg
MFP-D485XL-02	MFP™-DY-485XL-Amino function	485/560	1 mg
MFP-D490-02	MFP™-DY-490-Amino function	491/515	1 mg
MFP-D495-X5-02	MFP™-DY-495-X5-Amino function	493/521	5 mg
MFP-D480XL-02	MFP™-DY-480XL-Amino function	500/630	1 mg
81162AS	HiLyte Fluor™ 488-aminomodified, TFA Salt	503/528	1 mg
MFP-D505-X5-02	MFP™-DY-505-X5-Amino function	505/530	1 mg
MFP-D510XL-02	MFP™-DY-510XL-Amino function	509/590	1 mg
MFP-D481XL-02	MFP™-DY-481XL-Amino function	515/650	1 mg
MFP-D520XL-02	MFP™-DY-520XL-Amino function	520/664	1 mg
MFP-D521XL-02	MFP™-DY-521XL-Amino function	523/668	1 mg
MFP-D555-02	MFP™-DY-555-Amino function	547/572	1 mg
MFP-D556-02	MFP™-DY-556-Amino function	548/573	1 mg
81252AS	HiLyte Fluor™ 555-aminomodified	551/567	1 mg
MFP-D550-02	MFP™-DY-550-Amino function	553/578	1 mg
MFP-D547P1-02	MFP™-DY-547P1-Amino function	560/575	1 mg
MFP-D549P1-02	MFP™-DY-549P1-Amino function	560/575	1 mg
MFP-D590-02	MFP™-DY-590-Amino function	580/599	1 mg
81273AS	HiLyte Fluor™ 594-aminomodified, TFA salt	593/616	1 mg
MFP-D594-02	MFP™-DY-594-Amino function	594/615	1 mg
MFP-D605-02	MFP™-DY-605-Amino function	600/624	1 mg
MFP-D610-02	MFP™-DY-610-Amino function	610/630	1 mg
MFP-D615-02	MFP™-DY-615-Amino function	621/641	1 mg
MFP-D634-02	MFP™-DY-634-Amino function	635/658	1 mg
MFP-D630-02	MFP™-DY-630-Amino function	636/657	1 mg

MFP-D632-02	MFP™-DY-632-Amino function	637/657	1 mg
MFP-D633-02	MFP™-DY-633-Amino function	637/657	1 mg
MFP-D631-02	MFP™-DY-631-Amino function	637/658	1 mg
MFP-D636-02	MFP™-DY-636-Amino function	645/671	1 mg
MFP-D635-02	MFP™-DY-635-Amino function	647/671	1 mg
81257AS	HiLyte Fluor™ 647-aminomodified	649/674	1 mg
MFP-D650-02	MFP™-DY-650-Amino function	653/674	1 mg
MFP-D654-02	MFP™-DY-654-Amino function	653/677	1 mg
MFP-D649P1-02	MFP™-DY-649P1-Amino function	655/676	1 mg
MFP-D651-02	MFP™-DY-651-Amino function	656/678	1 mg
MFP-D678-02	MFP™-DY-678-Amino function	674/694	1 mg
MFP-D675-02	MFP™-DY-675-Amino function	674/699	1 mg
MFP-D676-02	MFP™-DY-676-Amino function	674/699	1 mg
81262AS	HiLyte Fluor™ 680-aminomodified	678/699	1 mg
MFP-D679P1-02	MFP™-DY-679P1-Amino function	679/697	1 mg
MFP-D680-02	MFP™-DY-680-Amino function	690/709	1 mg
MFP-D682-02	MFP™-DY-682-Amino function	690/709	1 mg
MFP-D681-02	MFP™-DY-681-Amino function	691/708	1 mg
MFP-D703-02	MFP™-DY-703-Amino function	705/721	1 mg
MFP-D701-02	MFP™-DY-701-Amino function	706/731	1 mg
MFP-D700-02	MFP™-DY-700-Amino function	707/730	1 mg
MFP-D730-02	MFP™-DY-730-Amino function	732/758	1 mg
MFP-D732-02	MFP™-DY-732-Amino function	736/759	1 mg
MFP-D734-02	MFP™-DY-734-Amino function	736/759	1 mg
MFP-D731-02	MFP™-DY-731-Amino function	736/760	1 mg
MFP-D750-02	MFP™-DY-750-Amino function	747/776	1 mg
MFP-D754-02	MFP™-DY-754-Amino function	748/771	1 mg
MFP-D752-02	MFP™-DY-752-Amino function	748/772	1 mg
MFP-D751-02	MFP™-DY-751-Amino function	751/779	1 mg
81267AS	HiLyte Fluor™ 750-aminomodified	754/778	1 mg
MFP-D777-02	MFP™-DY-777-Amino function	770/788	1 mg
MFP-D776-02	MFP™-DY-776-Amino function	771/793	1 mg
MFP-D800-02	MFP™-DY-800-Amino function	777/791	1 mg
MFP-D780-02	MFP™-DY-780-Amino function	782/800	1 mg
MFP-D781-02	MFP™-DY-781-Amino function	783/800	1 mg
MFP-D782-02	MFP™-DY-782-Amino function	783/800	1 mg
MFP-D831-02	MFP™-DY-831-Amino function	844/875	1 mg

3.3 Cadaverines

As already discussed in 3.2, cadaverines can be used as fluorescent transglutaminase substrates to label proteins by transamidation. For example, TAMRA (carboxytetramethylrhodamine) is one of the most popular fluorophores used in various bioconjugations. TAMRA is a bright orange fluorophore. 5(6)-TAMRA is the mixture of two TAMRA isomers. 5-TAMRA cadaverine and 6-TAMRA cadaverine are the purified single isomers of 5(6)-TAMRA cadaverine mixture. They are preferred for some complicated biological applications where reproducibility is more critical than material cost since the minor positional difference between 5-isomer and 6-isomer might have biological implications.



Order#	Product	Ex/Em (nm)	Amount
60648AS	Biotin cadaverine (N-(5-Aminopentyl)biotinamide)	N/A	25 mg
81501AS	Dansyl cadaverine	333/518	25 mg
81502AS	5-FAM cadaverine	494/521	10 mg
81504AS	5-FITC cadaverine	492/516	5 mg
81506AS	5(6)-TAMRA cadaverine	544/570	10 mg
81507AS	5-TAMRA cadaverine	545/576	5 mg
81508AS	6-TAMRA cadaverine	544/575	5 mg
81510AS	Sulforhodamine 101 cadaverine	583/601	5 mg

3.4 Carbonyl-reactive hydrazides

Fluorescent hydrazides are carbonyl-reactive fluorescent labeling dyes. They can be used for labeling glycoproteins such as HRP. Although certain aromatic amines such as 8-aminonaphthalene-1,3,6-trisulfonic acid (ANTS) and 8-aminopyrene-1,3,6-trisulfonic acid (APTS) have been extensively utilized to modify reducing sugars for analysis and sequencing, the most reactive reagents for forming stable conjugates of aldehydes and ketones are usually hydrazine derivatives, including hydrazides, semicarbazides and carbohydrazides (**Figure 3.**), as well as hydroxylamine derivatives. Hydrazine derivatives react with ketones to yield relatively stable hydrazones (**Figure 4.**), and with aldehydes to yield hydrazones that are somewhat less stable, though they may be formed faster. In addition, hydrazides are low molecular weight, cell membrane-impermeant, aldehyde-fixable molecules that can be used as a cell tracer, e.g., by loading into cells by microinjection, infusion from patch pipette, or uptake induced by pinocytic cell-loading reagents.

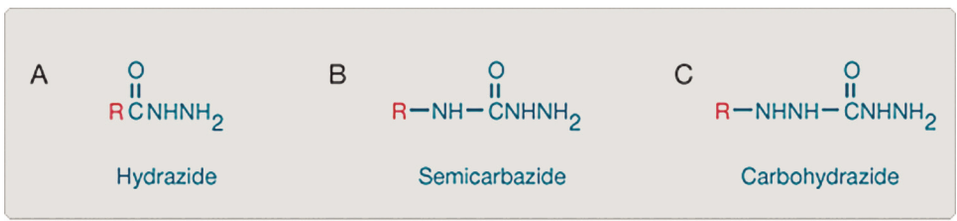


Figure 3. Structures of A) a hydrazide, B) a semicarbazide, and C) a carbohydrazide

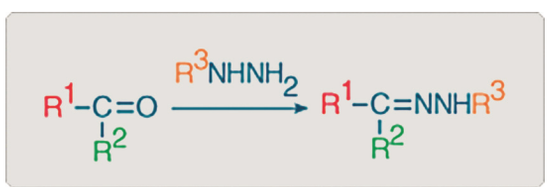


Figure 4. Modifying aldehydes and ketones with hydrazine derivatives

Order#	Product	Ex/Em (nm)	Amount
60647AS	Biocytin hydrazide	N/A	25 mg
81848AS	QXL™ 570 hydrazide	577/none	5 mg
81520AS	Dansyl hydrazide	333/518	100 mg
81237AS	1-Pyrenebutanoic acid, hydrazide	341/376	100 mg
89319AS	HiLyte Fluor™ 405 hydrazide	404/428	1 mg
MFP-A1436	MFP488-hydrazide	501/523	1 mg
81163AS	HiLyte Fluor™ 488 hydrazide	502/527	1 mg
81253AS	HiLyte Fluor™ 555 hydrazide	552/569	1 mg
81274AS	HiLyte Fluor™ 594 hydrazide, TFA Salt	593/616	1 mg
MFP-D594-04	MFP™-DY-594-hydrazide	594/615	1 mg
MFP-D634-04	MFP™-DY-634-hydrazide	635/658	1 mg
MFP-D631-04	MFP™-DY-631-hydrazide	637/658	1 mg
81258AS	HiLyte Fluor™ 647 hydrazide	649/674	1 mg
MFP-D647P1-04	MFP™-DY-647P1-Hydrazide	653/672	1 mg
81263AS	HiLyte Fluor™ 680 hydrazide	678/699	1 mg
MFP-D682-04	MFP™-DY-682-hydrazide	690/709	1 mg
MFP-D681-04	MFP™-DY-681-hydrazide	691/708	1 mg
MFP-D730-04	MFP™-DY-730-hydrazide	732/758	1 mg
81268AS	HiLyte Fluor™ 750 hydrazide	754/778	1 mg
MFP-D782-04	MFP™-DY-782-hydrazide	783/800	1 mg

3.5 Carboxylic acids

Order#	Product	Ex/Em (nm)	Amount
MFP-D660-00-1	MFP™-DYQ-660-Carboxylic Acid	660/none	1 mg
MFP-D485XL-00-1	MFP™-DY-485XL-Carboxylic Acid	485/560	1 mg
MFP-D490-00-1	MFP™-DY-490-Carboxylic Acid	491/515	1 mg
MFP-D480XL-00-1	MFP™-DY-480XL-Carboxylic Acid	500/630	1 mg
MFP-D481XL-00-1	MFP™-DY-481XL-Carboxylic Acid	515/650	1 mg

MFP-D520XL-00-1	MFP™-DY-520XL-Carboxylic Acid	520/664	1 mg
MFP-D521XL-00-1	MFP™-DY-521XL-Carboxylic Acid	523/668	1 mg
MFP-D530-00-1	MFP™-DY-530-Carboxylic Acid	539/561	1 mg
MFP-D555-00-1	MFP™-DY-555-Carboxylic Acid	547/572	1 mg
MFP-D556-00-1	MFP™-DY-556-Carboxylic Acid	548/573	1 mg
MFP-D554-00-1	MFP™-DY-554-Carboxylic Acid	551/572	1 mg
MFP-D550-00-1	MFP™-DY-550-Carboxylic Acid	553/578	1 mg
MFP-D560-00-1	MFP™-DY-560-Carboxylic Acid	559/578	1 mg
MFP-D590-00-1	MFP™-DY-590-Carboxylic Acid	580/599	1 mg
MFP-D591-00-1	MFP™-DY-591-Carboxylic Acid	581/598	1 mg
MFP-D594-00-1	MFP™-DY-594-Carboxylic Acid	594/615	1 mg
MFP-D605-00-1	MFP™-DY-605-Carboxylic Acid	600/624	1 mg
MFP-D610-00-1	MFP™-DY-610-Carboxylic Acid	610/630	1 mg
MFP-D615-00-1	MFP™-DY-615-Carboxylic Acid	621/641	1 mg
MFP-D634-00-1	MFP™-DY-634-Carboxylic Acid	635/658	1 mg
MFP-D630-00-1	MFP™-DY-630-Carboxylic Acid	636/657	1 mg
MFP-D632-00-1	MFP™-DY-632-Carboxylic Acid	637/657	1 mg
MFP-D633-00-1	MFP™-DY-633-Carboxylic Acid	637/657	1 mg
MFP-D631-00-1	MFP™-DY-631-Carboxylic Acid	637/658	1 mg
MFP-D636-00-1	MFP™-DY-636-Carboxylic Acid	645/671	1 mg
MFP-D635-00-1	MFP™-DY-635-Carboxylic Acid	647/671	1 mg
MFP-D647P1-00-1	MFP™-DY-647P1-Carboxylic Acid	653/672	1 mg
MFP-D648P1-00-1	MFP™-DY-648P1-Carboxylic Acid	653/672	1 mg
MFP-D650-00-1	MFP™-DY-650-Carboxylic Acid	653/674	1 mg
MFP-D654-00-1	MFP™-DY-654-Carboxylic Acid	653/677	1 mg
MFP-D652-00-1	MFP™-DY-652-Carboxylic Acid	654/675	1 mg
MFP-D649P1-00-1	MFP™-DY-649P1-Carboxylic Acid	655/676	1 mg
MFP-D651-00-1	MFP™-DY-651-Carboxylic Acid	656/678	1 mg
MFP-D678-00-1	MFP™-DY-678-Carboxylic Acid	674/694	1 mg
MFP-D677-00-1	MFP™-DY-677-Carboxylic Acid	674/698	1 mg
MFP-D675-00-1	MFP™-DY-675-Carboxylic Acid	674/699	1 mg
MFP-D676-00-1	MFP™-DY-676-Carboxylic Acid	674/699	1 mg
MFP-D679P1-00-1	MFP™-DY-679P1-Carboxylic Acid	679/697	1 mg
MFP-D680-00-1	MFP™-DY-680-Carboxylic Acid	690/709	1 mg
MFP-D682-00-1	MFP™-DY-682-Carboxylic Acid	690/709	1 mg
MFP-D681-00-1	MFP™-DY-681-Carboxylic Acid	691/708	1 mg
MFP-D703-00-1	MFP™-DY-703-Carboxylic Acid	705/721	1 mg
MFP-D704-00-1	MFP™-DY-704-Carboxylic Acid	706/721	1 mg
MFP-D701-00-1	MFP™-DY-701-Carboxylic Acid	706/731	1 mg
MFP-D700-00-1	MFP™-DY-700-Carboxylic Acid	707/730	1 mg
MFP-D730-00-1	MFP™-DY-730-Carboxylic Acid	732/758	1 mg
MFP-D732-00-1	MFP™-DY-732-Carboxylic Acid	736/759	1 mg
MFP-D734-00-1	MFP™-DY-734-Carboxylic Acid	736/759	1 mg
MFP-D731-00-1	MFP™-DY-731-Carboxylic Acid	736/760	1 mg
MFP-D750-00-1	MFP™-DY-750-Carboxylic Acid	747/776	1 mg
MFP-D754-00-1	MFP™-DY-754-Carboxylic Acid	748/771	1 mg
MFP-D752-00-1	MFP™-DY-752-Carboxylic Acid	748/772	1 mg
MFP-D751-00-1	MFP™-DY-751-Carboxylic Acid	751/779	1 mg
MFP-D749P1-00-1	MFP™-DY-749P1-Carboxylic Acid	759/780	1 mg
MFP-D778-00-1	MFP™-DY-778-Carboxylic Acid	767/787	1 mg
MFP-D777-00-1	MFP™-DY-777-Carboxylic Acid	770/788	1 mg
MFP-D776-00-1	MFP™-DY-776-Carboxylic Acid	771/793	1 mg
MFP-D800-00-1	MFP™-DY-800-Carboxylic Acid	777/791	1 mg
MFP-D780-00-1	MFP™-DY-780-Carboxylic Acid	782/800	1 mg
MFP-D781-00-1	MFP™-DY-781-Carboxylic Acid	783/800	1 mg
MFP-D782-00-1	MFP™-DY-782-Carboxylic Acid	783/800	1 mg
MFP-D831-00-1	MFP™-DY-831-Carboxylic Acid	844/875	1 mg

3.6 Free acids

Order#	Product	Ex/Em (nm)	Amount
MFP-D350-00-1	MFP™-DY-350, free acid	353/432	1 mg
MFP-D405-00-1	MFP™-DY-405, free acid	400/423	1 mg
MFP-D415-00-1	MFP™-DY-415, free acid	418/467	1 mg
MFP-D430-00-1	MFP™-DY-430, free acid	491/515	1 mg
MFP-D495-X5-00-1	MFP™-DY-495-X5, free acid	493/521	10 mg
MFP-D505-X5-00-1	MFP™-DY-505-X5, free acid	505/530	5 mg
MFP-D547P1-00-1	MFP™-DY-547P1, free acid	560/575	1 mg
MFP-D549P1-00-1	MFP™-DY-549P1, free acid	560/575	1 mg
MFP-D510XL-00-1	MFP™-DY-510XL, free acid	509/590	1 mg

4. Biotins & Avidins/Streptavidins

The avidin/streptavidin-biotin interaction is the strongest known non-covalent biological interaction ($K_d = 10^{-15}\ M^{-1}$) between a protein and its ligand. The bond formation between biotin and avidin/streptavidin is very rapid and, once formed, is unaffected by pH, organic solvents, and other denaturing agents. The avidin-biotin complex can even withstand 3 M guanidine. Both avidin and streptavidin have essentially irreversible biotin-binding properties since bound biotin can only be released by denaturing the subunits of the proteins. The tight and specific binding of biotin and its derivatives to various avidins has been extensively explored for a number of biological applications.

Biotins

Order#	Product	Ex/Em (nm)	Amount
MFP-D660-30-1	MFP™-DYQ-660-Biotin	660/none	1 mg
MFP-D350-30-1	MFP™-DY-350-Biotin	353/432	1 mg
MFP-D405-30-1	MFP™-DY-405-Biotin	400/423	1 mg
MFP-D415-30-1	MFP™-DY-415-Biotin	418/467	1 mg
MFP-D485XL-30-1	MFP™-DY-485XL-Biotin	485/560	1 mg
MFP-D490-30-1	MFP™-DY-490-Biotin	491/515	1 mg
60656AS	Fluorescein biotin	494/518	5 mg
60654AS	Biotin-4-fluorescein	494/523	10 mg
MFP-D480XL-30-1	MFP™-DY-480XL-Biotin	500/630	1 mg
MFP-D505-X5-30-1	MFP™-DY-505-X5-Biotin	505/530	500 µg
MFP-D481XL-30-1	MFP™-DY-481XL-Biotin	515/650	1 mg
MFP-D520XL-30-1	MFP™-DY-520XL-Biotin	520/664	1 mg
MFP-D521XL-30-1	MFP™-DY-521XL-Biotin	523/668	1 mg
MFP-D530-30-1	MFP™-DY-530-Biotin	539/561	1 mg
MFP-D555-30-1	MFP™-DY-555-Biotin	547/572	1 mg
MFP-D554-30-1	MFP™-DY-554-Biotin	551/572	1 mg
MFP-D550-30-1	MFP™-DY-550-Biotin	553/578	1 mg
MFP-D591-30-1	MFP™-DY-591-Biotin	581/598	1 mg
MFP-D610-30-1	MFP™-DY-610-Biotin	610/630	1 mg
MFP-D615-30-1	MFP™-DY-615-Biotin	621/641	1 mg
MFP-D634-30-1	MFP™-DY-634-Biotin	635/658	500 µg
MFP-D630-30-1	MFP™-DY-630-Biotin	636/657	1 mg
MFP-D632-30-1	MFP™-DY-632-Biotin	637/657	1 mg
MFP-D633-30-1	MFP™-DY-633-Biotin	637/657	1 mg
MFP-D631-30-1	MFP™-DY-631-Biotin	637/658	1 mg
MFP-D636-30-1	MFP™-DY-636-Biotin	645/671	1 mg
MFP-D635-30-1	MFP™-DY-635-Biotin	647/671	1 mg
MFP-D650-30-1	MFP™-DY-650-Biotin	653/674	1 mg
MFP-D652-30-1	MFP™-DY-652-Biotin	654/675	1 mg
MFP-D649P1-30-1	MFP™-DY-649P1-Biotin	655/676	1 mg
MFP-D651-30-1	MFP™-DY-651-Biotin	656/678	1 mg
MFP-D676-30-1	MFP™-DY-676-Biotin	674/699	1 mg
MFP-D682-30-1	MFP™-DY-682-Biotin	690/709	1 mg
MFP-D681-30-1	MFP™-DY-681-Biotin	691/708	1 mg
MFP-D704-30-1	MFP™-DY-704-Biotin	706/721	1 mg
MFP-D701-30-1	MFP™-DY-701-Biotin	706/731	1 mg
MFP-D730-30-1	MFP™-DY-730-Biotin	732/758	1 mg
MFP-D732-30-1	MFP™-DY-732-Biotin	736/759	1 mg
MFP-D734-30-1	MFP™-DY-734-Biotin	736/759	1 mg
MFP-D731-30-1	MFP™-DY-731-Biotin	736/760	1 mg
MFP-D750-30-1	MFP™-DY-750-Biotin	747/776	1 mg
MFP-D754-30-1	MFP™-DY-754-Biotin	748/771	1 mg
MFP-D752-30-1	MFP™-DY-752-Biotin	748/772	1 mg
MFP-D751-30-1	MFP™-DY-751-Biotin	751/779	1 mg
MFP-D800-30-1	MFP™-DY-800-Biotin	777/791	1 mg
MFP-D780-30-1	MFP™-DY-780-Biotin	782/800	1 mg
MFP-D781-30-1	MFP™-DY-781-Biotin	783/800	1 mg
72162AS	AnaPrep™ Biotin Blocking Kit	N/A	1 kit

Avidins/streptavidins

Order#	Product	Ex/Em (nm)	Amount
60672-H405AS	Streptavidin, HiLyte Fluor™ 405 labeled	404/428	1 mg
60659-FITCAS	Streptavidin, FITC conjugated	490/520	1 mg
60664AS	Streptavidin, 5-FAM conjugated	492/519	1 mg
60665AS	Streptavidin, HiLyte Fluor™ 488 conjugated	495/524	1 mg

72003-20AS	HiLyte Fluor™ Labeled Streptavidin Sampler Kit (3 each; 8-80 samples in size of 10 x 10 mm)	499/523;553/ 568;653/673	1 kit
72003-200AS	HiLyte Fluor™ Labeled Streptavidin Sampler Kit (3 each; 80-800 samples in size of 10 x 10 mm)	499/523;553/ 568;653/673	1 kit
MFP-S1223	MFP488-streptavidin	501/523	1 mg
60670AS	Streptavidin, 5-TAMRA conjugated	541/568	1 mg
60662AS	Streptavidin, B-phycoerythrin conjugated	545/575	0.5 mg
60666AS	Streptavidin, HiLyte Fluor™ 555 conjugated	555/565	1 mg
60669AS	Streptavidin, R-phycoerythrin conjugated	565/575	0.5 mg
60672-H594AS	Streptavidin, HiLyte Fluor™ 594 conjugated	596/617	1 mg
60667AS	Streptavidin, HiLyte Fluor™ 647 conjugated	650/668	1 mg
60659-H680AS	Streptavidin, HiLyte Fluor™ 680 conjugated	678/699	1 mg
60659-H750AS	Streptavidin, HiLyte Fluor™ 750 conjugated	754/778	1 mg
60659AS	Streptavidin	N/A	5 mg
PRO-283-2PS	Streptavidin	N/A	10 mg
PRO-283-3PS	Streptavidin	N/A	100 mg
60659-100AS	Streptavidin	N/A	100 mg
60659-500AS	Streptavidin	N/A	500 mg
60659-1000AS	Streptavidin	N/A	1 g
P3070-2-UBP	Streptavidin XPure Agarose Resin	N/A	2 ml
P3070-5-UBP	Streptavidin XPure Agarose Resin	N/A	5 ml
60660AS	Streptavidin, alkaline phosphatase conjugated	N/A	0.5 mg
60663AS	Streptavidin, crosslinked allophycocyanin conjugated	N/A	0.2 mg
60668AS	Streptavidin, HRP conjugated	N/A	1 mg
72177-5AS	Streptavidin, recombinant	N/A	5 mg
72177-100AS	Streptavidin, recombinant	N/A	100 mg
72177-500AS	Streptavidin, recombinant	N/A	500 mg

5. Phalloidins

Phalloidin is a bicyclic peptide belonging to a family of toxins isolated from a deadly poisonous *Amanita phalloides* mushroom, the trivial name is death cap, and is commonly used in imaging applications to selectively label F-actin. Fluorescently-labeled phalloidin has several advantages over antibodies for actin labeling, including virtually identical binding properties with actin from different species of plants and animals, and high selectivity.

Order#	Product	Ex/Em (nm)	Amount
MFP-D350-33	MFP™-DY-350-Phalloidin	353/432	300 Units
MFP-D405-33	MFP™-DY-405-Phalloidin	400/423	300 Units
MFP-D415-33	MFP™-DY-415-Phalloidin	418/467	300 Units
MFP-D485XL-33	MFP™-DY-485XL-Phalloidin	485/560	300 Units
MFP-D490-33	MFP™-DY-490-Phalloidin	491/515	300 Units
MFP-D495-33	MFP™-DY-495-Phalloidin	493/521	300 Units
MFP-D480XL-33	MFP™-DY-480XL-Phalloidin	500/630	300 Units
MFP-D481XL-33	MFP™-DY-481XL-Phalloidin	515/650	300 Units
MFP-D520XL-33	MFP™-DY-520XL-Phalloidin	520/664	300 Units
MFP-D521XL-33	MFP™-DY-521XL-Phalloidin	523/668	300 Units
MFP-D555-33	MFP™-DY-555-Phalloidin	547/572	300 Units
MFP-D556-33	MFP™-DY-556-Phalloidin	548/573	300 Units
MFP-D554-33	MFP™-DY-554-Phalloidin	551/572	300 Units
MFP-D547P1-33	MFP™-DY-547P1-Phalloidin	560/575	300 Units
MFP-D549P1-33	MFP™-DY-549P1-Phalloidin	560/575	300 Units
MFP-D590-33	MFP™-DY-590-Phalloidin	580/599	300 Units
MFP-D591-33	MFP™-DY-591-Phalloidin	581/598	300 Units
MFP-D594-33	MFP™-DY-594-Phalloidin	594/615	300 Units
MFP-D605-33	MFP™-DY-605-Phalloidin	600/624	300 Units
MFP-D634-33	MFP™-DY-634-Phalloidin	635/658	300 Units
MFP-D632-33	MFP™-DY-632-Phalloidin	637/657	300 Units
MFP-D633-33	MFP™-DY-633-Phalloidin	637/657	300 Units
MFP-D631-33	MFP™-DY-631-Phalloidin	637/658	300 Units
MFP-D636-33	MFP™-DY-636-Phalloidin	645/671	300 Units
MFP-D635-33	MFP™-DY-635-Phalloidin	647/671	300 Units
MFP-D647P1-33	MFP™-DY-647P1-Phalloidin	653/672	300 Units
MFP-D654-33	MFP™-DY-654-Phalloidin	653/677	1 mg
MFP-D649P1-33	MFP™-DY-649P1-Phalloidin	655/676	300 Units
MFP-D651-33	MFP™-DY-651-Phalloidin	656/678	300 Units
MFP-D682-33	MFP™-DY-682-Phalloidin	690/709	300 Units

6. Protein Labeling Kits

Incorporating some of the industry's brightest and most photostable dyes in a speedy and most convenient kit, MoBiTec provides Protein Labeling Kits as a perfect marriage of performance and convenience.

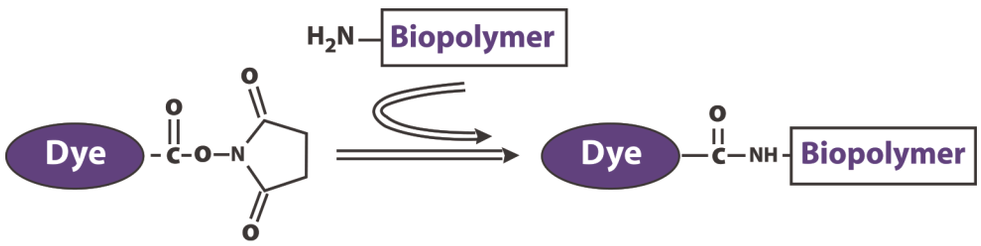


Figure 5. Labeling of an amino group (for instance, a lysine) on a biopolymer with a succinimidyl ester of a dye

6.1 Protein labeling kits for amino groups

Order#	Product	Ex/Em (nm)	Unit Size
72058AS	AnaTag™ Biotin Microscale Protein Labeling Kit	N/A	3 x 200 µg
72057AS	AnaTag™ Biotin Protein Labeling Kit	N/A	3 x 10 mg
FP-201-MNT-JB	Mant Protein Labeling Kit	335/440	10 x 1 mg
72056AS	AnaTag™ AMCA-X Microscale Protein Labeling Kit	353/442	3 x 200 µg
72055AS	AnaTag™ AMCA-X Protein Labeling Kit	353/442	3 x 5 mg
72142AS	AnaTag™ HiLyte Fluor™ 405 Microscale Protein Labeling Kit	407/429	2 x 200 µg
72143AS	AnaTag™ HiLyte Fluor™ 405 Protein Labeling Kit	407/429	3 x 5 mg
FP-201-425-JB	Atto 425 Protein Labeling Kit	436/484	10 x 1 mg
72060AS	AnaTag™ 5 - FITC Microscale Protein Labeling Kit	494/519	3 x 200 µg
72059AS	AnaTag™ 5 - FITC Protein Labeling Kit	494/519	3 x 5 mg
72054AS	AnaTag™ 5 - FAM Microscale Protein Labeling Kit	495/520	3 x 200 µg
72053AS	AnaTag™ 5 - FAM Protein Labeling Kit	495/520	3 x 5 mg
72113AS	AnaTag™ R-PE Labeling Kit	498, 539, 565 /578	1 x 1 mg
72048AS	AnaTag™ HiLyte Fluor™ 488 Microscale Protein Labeling Kit	499/523	3 x 200 mg
72047AS	AnaTag™ HiLyte Fluor™ 488 Protein Labeling Kit	499/523	3 x 5 mg
MFP-A1235	MFP488 Protein Labeling Kit	501/523	3 x 1 mg
MFP-A2181	MFP488 Antibody Labeling Kit	501/523	5 x 1 mg
FP-201-488-JB	Atto 488 Protein Labeling Kit	501/523	10 x 1 mg
FP-201-532-JB	Atto 532 Protein Labeling Kit	532/553	10 x 1 mg
72112AS	AnaTag™ B-PE Labeling Kit	545, 563/578	1 x 1 mg
72064AS	AnaTag™ 5 - TAMRA Microscale Protein Labeling Kit	547/574	3 x 200 µg
72063AS	AnaTag™ 5 - TAMRA Protein Labeling Kit	547/574	3 x 5 mg
FP-201-CY3-JB	Cy™3 Protein Labeling Kit	550/570	10 x 1 mg
72046AS	AnaTag™ HiLyte Fluor™ 555 Microscale Protein Labeling Kit	553/568	3 x 200 µg
72045AS	AnaTag™ HiLyte Fluor™ 555 Protein Labeling Kit	553/568	3 x 5 mg
FP-201-550-JB	Atto 550 Protein Labeling Kit	554/576	10 x 1 mg
72062AS	AnaTag™ 5 - ROX Microscale Protein Labeling Kit	573/602	3 x 200 µg
72061AS	AnaTag™ 5 - ROX Protein Labeling Kit	573/602	3 x 5 mg
FP-201-TXR-JB	Texas Red Protein Labeling Kit	583/603	10 x 1 mg
FP-201-590-JB	Atto 590 Protein Labeling Kit	594/624	10 x 1 mg
FP-201-647N-JB	Atto 647N Protein Labeling Kit	644/669	10 x 1 mg
FP-201-CY5-JB	Cy™5 Protein Labeling Kit	649/670	10 x 1 mg
72111AS	AnaTag™ APC Labeling Kit	650/660	1 x 1 mg
72050AS	AnaTag™ HiLyte Fluor™ 647 Microscale Protein Labeling Kit	652/669	3 x 200 µg
72049AS	AnaTag™ HiLyte Fluor™ 647 Protein Labeling Kit	652/669	3 x 5 mg
FP-201-655-JB	Atto 655 Protein Labeling Kit	663/684	10 x 1 mg
72118AS	AnaTag™ HiLyte Fluor™ 680 Microscale Protein Labeling Kit	678/699	3 x 200 µg
72119AS	AnaTag™ HiLyte Fluor™ 680 Protein Labeling Kit	678/699	3 x 5 mg
72044AS	AnaTag™ HiLyte Fluor™ 750 Microscale Protein Labeling Kit	754/778	3 x 200 µg
72043AS	AnaTag™ HiLyte Fluor™ 750 Protein Labeling Kit	754/778	3 x 5 mg

6.2 Protein labeling kits for thiol groups

MoBiTec's versatile protein labeling kits for thiol groups are designed for fluorescent labeling of proteins with a small fluorophore. Each kit contains all reagents required for performing 3 separate labeling reactions resulting in a fluorescent protein-fluorophore conjugate. The outstanding photostability and quantum yield of the thoroughly selected dyes provide a wide range of applications such as protein activity and functional studies, and many more.

Order#	Product	Ex/Em (nm)	Unit Size
FP-202-425-JB	Atto425 Protein Labeling Kit	436/484	3 rxn
FP-202-488-JB	Atto488 Protein Labeling Kit	501/523	3 rxn
FP-202-532-JB	Atto532 Protein Labeling Kit	532/550	3 rxn
FP-202-550-JB	Atto550 Protein Labeling Kit	554/576	3 rxn
FP-202-590-JB	Atto590 Protein Labeling Kit	594/624	3 rxn
FP-202-TXR-JB	Texas Red Protein Labeling Kit	583/603	3 rxn
FP-202-647N-JB	Atto647N Protein Labeling Kit	644/669	3 rxn
FP-202-655-JB	Atto655 Protein Labeling Kit	663/684	3 rxn

7. Nucleic Acid Labeling Kits and Reagents

7.1 The *Label* IT® Nucleic Acid Labeling Kits

The Mirus *Label* IT® chemical labeling reagents are composed of three regions (**Figure 6.**): the label (fluorophore or hapten) (green), the linker (yellow) which facilitates electrostatic interactions with nucleic acids and the reactive alkylating group (blue) that covalently attaches the *Label* IT® reagent to any reactive heteroatom within the nucleic acids. Attachment of the *Label* IT® Reagents to nucleic acids does not alter the structure of the nucleic acid or affect downstream hybridization performance, and as such, nucleic acids labeled using the *Label* IT® Reagents can be employed in multiple applications as defined by the researcher.

- **Label any DNA or RNA template** - Suitable for a wide range of applications.
- **One-step chemical method** - Easily and consistently control the labeling reactions.
- **Adjustable labeling density** - Achieve high sensitivity with optimally labeled DNA and RNA.
- **Covalent mechanism** - Permanent, non-destructive modification of nucleic acid residues is ideal for many diverse applications; labels do not impact hybridization performance.

"Labels DNA, RNA, plasmids, genomic DNA - you name it."

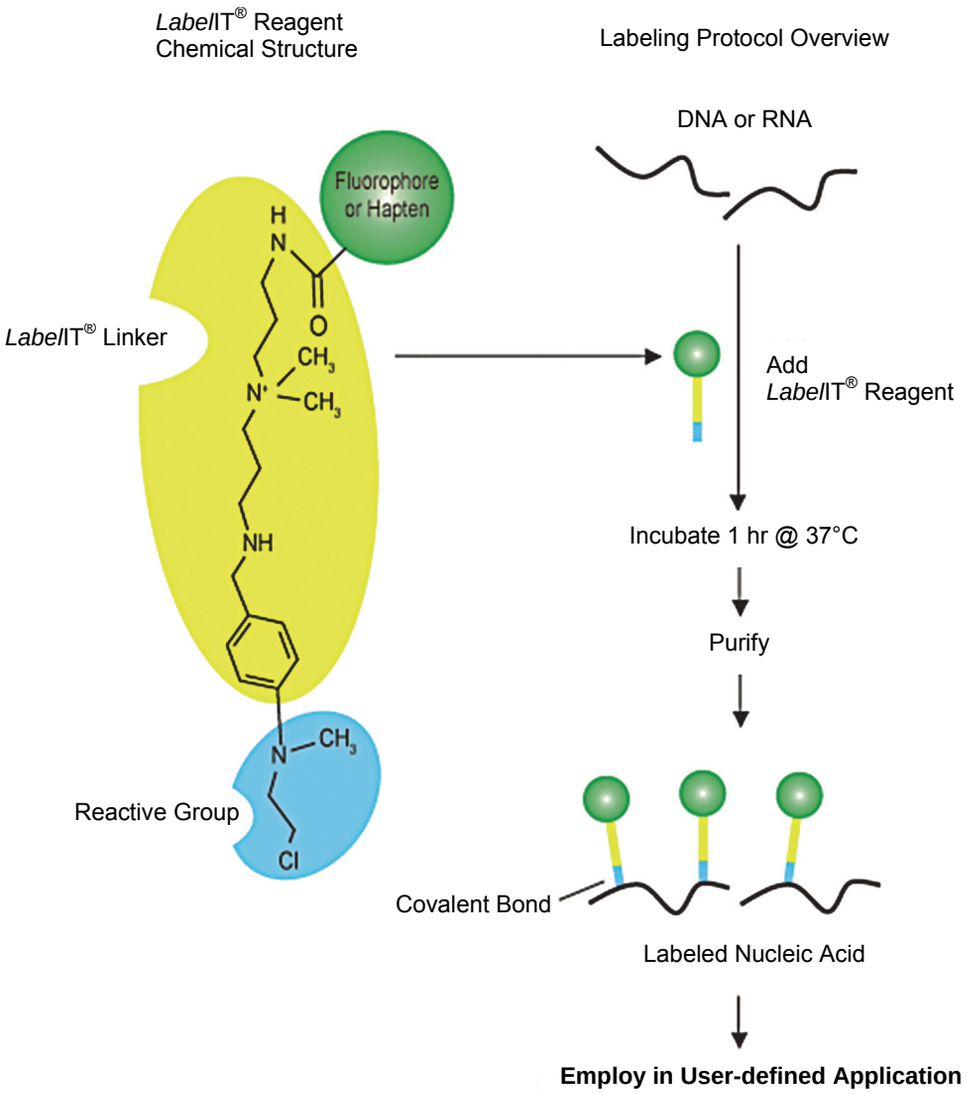


Figure 6. The *Label* IT® Nucleic Acid Labeling Kits

Mirus' Universal *Label* IT® Nucleic Acid Labeling Kits

Traditional nonradioactive Labeling methods (random priming, nick translation) are enzyme mediated and thus inherently difficult to control. In addition, these types of reactions generate Labeled products that are not representative of the starting nucleic acid but rather consist of a series of Labeled samples over a variable size range. The Labeling efficiency of these reactions is dictated by the enzyme's ability to incorporate a "Labeled-nucleotide" precursor into a growing nucleic acid chain. This Labeled-nucleotide is not the preferred substrate for the enzyme and may compromise the efficiency of the reaction and introduce a Labeling bias. In contrast, the *Label* IT® Labeling reactions are nondestructive, easy to control, and can be scaled up or down by either the size of the reaction or the desired Labeling density.

Order#	Product	Ex/Em (nm)	Unit Size
MIR3925	Label IT® AMINE Nucleic Acid Labeling Kit	N/A	Labels 25 µg
MIR3900	Label IT® AMINE Nucleic Acid Labeling Kit	N/A	Labels 100 µg
MIR3425	Label IT® Biotin Nucleic Acid Labeling Kit	N/A	Labels 25 µg
MIR3400	Label IT® Biotin Nucleic Acid Labeling Kit	N/A	Labels 100 µg
MIR3325	Label IT® Digoxin Nucleic Acid Labeling Kit	N/A	Labels 25 µg
MIR3300	Label IT® Digoxin Nucleic Acid Labeling Kit	N/A	Labels 100 µg
MIR3825	Label IT® DNP Nucleic Acid Labeling Kit	N/A	Labels 25 µg
MIR3800	Label IT® DNP Nucleic Acid Labeling Kit	N/A	Labels 100 µg
MIR3225	Label IT® Fluorescein Nucleic Acid Labeling Kit	492/518	Labels 25 µg
MIR3200	Label IT® Fluorescein Nucleic Acid Labeling Kit	492/518	Labels 100 µg
MIR4125	Label IT® TM-Rhodamine Nucleic Acid Labeling Kit	546/576	Labels 25 µg
MIR4100	Label IT® TM-Rhodamine Nucleic Acid Labeling Kit	546/576	Labels 100 µg
MIR3625	Label IT® Cy™3 Nucleic Acid Labeling Kit	550/570	Labels 25 µg
MIR3600	Label IT® Cy™3 Nucleic Acid Labeling Kit	550/570	Labels 100 µg

MIR3125	Label IT® CX-Rhodamine Nucleic Acid Labeling Kit	576/597	Labels 25 µg
MIR3100	Label IT® CX-Rhodamine Nucleic Acid Labeling Kit	576/597	Labels 100 µg
MIR3725	Label IT® Cy™5 Nucleic Acid Labeling Kit	649/670	Labels 25 µg
MIR3700	Label IT® Cy™5 Nucleic Acid Labeling Kit	649/670	Labels 100 µg

Label IT® miRNA Labeling Kits

Rapid and sensitive non-enzymatic labeling of microRNA (miRNA) in total or enriched RNA samples for microarray analysis.

- Sensitive - Detects subattomolar amounts of miRNA species.
- Accurate - Labels all miRNAs present in the sample.
- Universal - Labels total or enriched RNA from fresh, frozen or FFPE tissues including plants.
- Sequence Independent Labeling - Labels all nucleotides with equal efficiency.
- Save Time - Simple, one hour protocol.

Order#	Product	Ex/Em (nm)	Unit Size
MIR9410	Label IT® miRNA labeling kit Biotin	N/A	10 reactions
MIR9450	Label IT® miRNA labeling kit Biotin	N/A	50 reactions
MIR9510	Label IT® miRNA labeling kit Cy™3	550/570	10 reactions
MIR9550	Label IT® miRNA labeling kit Cy™3	550/570	50 reactions
MIR9610	Label IT® miRNA labeling kit Cy™5	649/670	10 reactions
MIR9650	Label IT® miRNA labeling kit Cy™5	649/670	50 reactions
MIR9305	Label IT® miRNA labeling kit Cy™3/Cy™5	see above	2 x 5 reactions
MIR9325	Label IT® miRNA labeling kit Cy™3/Cy™5	see above	2 x 25 reactions

µArray® *Label* IT® Nucleic Acid Labeling Kits

Optimized labeling kit designed for single- or dual-channel microarray applications using biotin, fluorescein, Cy3™, and Cy5™.

- One-step Chemical Method - Easily and consistently achieve optimized labeling densities for microarray applications.
- Sensitive Detection - Confidently detect rare transcripts and small changes in gene expression.
- Versatile Labeling - Suitable for labeling mRNA, cDNA, and cRNA templates with biotin, fluorescein, Cy™3, and Cy™5 dyes for expression profiling analysis.

Order#	Product	Ex/Em (nm)	Unit Size
MIR8010	Label IT® µArray® Biotin Kit	N/A	10 reactions
MIR8050	Label IT® µArray® Biotin Kit	N/A	50 reactions
MIR8105	Label IT® µArray® Dual Kit (Biotin/Fluorescein)	492/518	2 x 5 reactions
MIR8125	Label IT® µArray® Dual Kit (Biotin/Fluorescein)	492/518	2 x 25 reactions
MIR8710	Label IT® µArray® Cy™3 Labeling Kit	550/570	10 reactions
MIR8750	Label IT® µArray® Cy™3 Labeling Kit	550/570	50 reactions
MIR8810	Label IT® µArray® Cy™5 Labeling Kit	649/670	10 reactions
MIR8850	Label IT® µArray® Cy™5 Labeling Kit	649/670	50 reactions
MIR8205	Label IT® µArray® Cy™3/Cy™5 Labeling Kit	see above	2 x 5 reactions
MIR8225	Label IT® µArray® Cy™3/Cy™5 Labeling Kit	see above	2 x 25 reactions

Label IT® Nucleic Acid Modifying Reagent

Efficient, direct, non-enzymatic attachment of functional groups to DNA and RNA

- Modify any DNA or RNA Template - Direct, covalent attachment of amine functional groups to any nucleic acid.
- One-step Chemical Method - Easily and consistently control the density of nucleic acid modification.
- Covalent Mechanism - Permanent, non-destructive modification of nucleic acids which can then be conjugated to proteins or peptides, or attached to glass surfaces, or beads or plates.

Order#	Product	Ex/Em (nm)	Unit Size
MIR3925	*Label* IT® AMINE Nucleic Acid Labeling Kit	N/A	Labels 25 µg
MIR3900	*Label* IT® AMINE Nucleic Acid Labeling Kit	N/A	Labels 100 µg

7.2 Nucleic acid labeling by PCR

MoBiTec PCR Labeling Kits are recommended for direct labeling of DNA by PCR using Taq polymerase. The fluorescently labeled dUTP analogs provided in the kits are optimized for enzymatic incorporation into DNA by a proprietary linker technology. Outstanding stability and quantum yield of the thoroughly selected fluorophores combined with high incorporation rates of the dye-dUTP analogs make the kits the ideal choice for all typical DNA labeling applications such as FISH, single molecule detection, microarray gene expression profiling, and other nucleic acid hybridization assays.

Order#	Product	Ex/Em (nm)	Unit Size
FT-LNT10001-01	Biotin PCR Labeling Kit	N/A	100 reactions
FT-LNT10001-05	Biotin PCR Labeling Kit	N/A	500 reactions
FT-LNT10010-01	Atto425 PCR Labeling Kit	436/484	10 reactions
FT-LNT10010-05	Atto425 PCR Labeling Kit	436/484	50 reactions
FT-LNT10020-01	Atto488 PCR Labeling Kit	501/523	10 reactions
FT-LNT10020-05	Atto488 PCR Labeling Kit	501/523	50 reactions
FT-LNT10032-01	Atto532 PCR Labeling Kit	532/553	10 reactions
FT-LNT10032-05	Atto532 PCR Labeling Kit	532/553	50 reactions
FT-LNT10055-01	Cy3 PCR Labeling Kit	550/570	10 reactions
FT-LNT10055-05	Cy3 PCR Labeling Kit	550/570	50 reactions
FT-LNT10040-05	Texas Red® PCR Labeling Kit	583/503	50 reactions
FT-LNT10040-01	Texas Red® PCR Labeling Kit	583/603	10 reactions
FT-LNT10065-01	Cy5 PCR Labeling Kit	643/667	10 reactions
FT-LNT10065-05	Cy5 PCR Labeling Kit	643/667	50 reactions
FT-LNT10070-01	Atto655 PCR Labeling Kit	663/684	10 reactions
FT-LNT10070-05	Atto655 PCR Labeling Kit	663/684	50 reactions

7.3 Nucleic acid labeling by nick translation

MoBiTec NT Labeling Kits are recommended for direct labeling of DNA by nick translation using DNA polymerase I / DNase I. The fluorescently labeled dUTP analogs provided in the kits are optimized for enzymatic incorporation into DNA by a proprietary linker technology. Outstanding stability and quantum yield of the thoroughly selected fluorophores combined with high incorporation rates of the dye-dUTP analogs make the kits the ideal choice for all typical DNA labeling applications such as FISH, single molecule detection, microarray gene expression profiling, and other nucleic acid hybridization assays.

Order#	Product	Ex/Em (nm)	Unit Size
FT-LNT20010-01	Atto425 NT Labeling Kit	436/484	10 reactions
FT-LNT20010-02	Atto425 NT Labeling Kit	436/484	50 reactions
FT-LNT20020-01	Atto488 NT Labeling Kit	501/523	10 reactions
FT-LNT20020-02	Atto488 NT Labeling Kit	501/523	50 reactions
FT-LNT20030-01	Atto550 NT Labeling Kit	554/576	10 reactions
FT-LNT20030-02	Atto550 NT Labeling Kit	554/576	50 reactions
FT-LNT20060-01	Atto647N NT Labeling Kit	663/684	10 reactions
FT-LNT20060-02	Atto647N NT Labeling Kit	663/684	50 reactions

7.4 Fluorescently labeled dUTP nucleotides

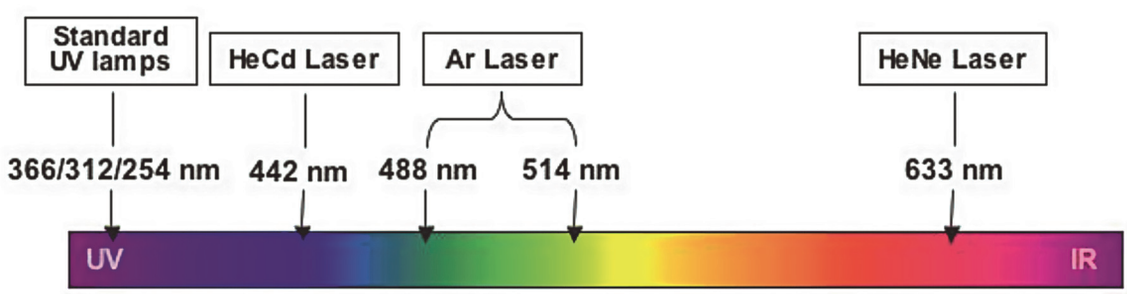


Figure 7. The spectral continuum in the range of visible light, indicating wavelengths of important laser types

Order#	Product	Ex/Em (nm)	Unit Size
MFP-D350-34	MFP™-DY-350-dUTP	353/432	100 nmole
MFP-D405-34	MFP™-DY-405-dUTP	400/423	100 nmole
MFP-D415-34	MFP™-DY-415-dUTP	418/467	100 nmole
FT-LNT50425-01	Aminoallyl-dUTP - ATTO-425	436/484	10 µl (1 mM)
FT-LNT50425-02	Aminoallyl-dUTP - ATTO-425	436/484	5 x 10 µl (1 mM)
MFP-D485XL-34	MFP™-DY-485XL-dUTP	485/560	100 nmole
MFP-D490-34	MFP™-DY-490-dUTP	491/515	100 nmole
MFP-D495-34	MFP™-DY-495-dUTP	493/521	100 nmole
MFP-D480XL-34	MFP™-DY-480XL-dUTP	500/630	100 nmole
FT-LNT50488-01	Aminoallyl-dUTP - ATTO-488	501/523	20 µl (1 mM)
MFP-D481XL-34	MFP™-DY-481XL-dUTP	515/650	100 nmole
MFP-D520XL-34	MFP™-DY-520XL-dUTP	520/664	100 nmole
MFP-D521XL-34	MFP™-DY-521XL-dUTP	523/668	100 nmole
MFP-D530-34	MFP™-DY-530-dUTP	539/561	100 nmole
MFP-D555-34	MFP™-DY-555-dUTP	547/572	100 nmole
MFP-D556-34	MFP™-DY-556-dUTP	548/573	100 nmole
MFP-D554-34	MFP™-DY-554-dUTP	551/572	100 nmole
FT-LNT50550-01	Aminoallyl-dUTP - ATTO-550	554/576	10 µl (1 mM)
FT-LNT50550-02	Aminoallyl-dUTP - ATTO-550	554/576	5 x 10 µl (1 mM)
MFP-D560-34	MFP™-DY-560-dUTP	559/578	100 nmole
MFP-D547P1-34	MFP™-DY-547P1-dUTP	560/575	100 nmole
MFP-D549P1-34	MFP™-DY-549P1-dUTP	560/575	100 nmole
MFP-D590-34	MFP™-DY-590-dUTP	580/599	100 nmole
MFP-D591-34	MFP™-DY-591-dUTP	581/598	100 nmole
MFP-D594-34	MFP™-DY-594-dUTP	594/615	100 nmole
MFP-D605-34	MFP™-DY-605-dUTP	600/624	100 nmole
MFP-D634-34	MFP™-DY-634-dUTP	635/658	100 nmole
MFP-D630-34	MFP™-DY-630-dUTP	636/657	100 nmole
MFP-D632-34	MFP™-DY-632-dUTP	637/657	100 nmole
MFP-D633-34	MFP™-DY-633-dUTP	637/657	100 nmole
MFP-D631-34	MFP™-DY-631-dUTP	637/658	100 nmole
MFP-D636-34	MFP™-DY-636-dUTP	645/671	100 nmole
MFP-D635-34	MFP™-DY-635-dUTP	647/671	100 nmole
MFP-D647P1-34	MFP™-DY-647P1-dUTP	653/672	100 nmole
MFP-D650-34	MFP™-DY-650-dUTP	653/674	100 nmole
MFP-D649P1-34	MFP™-DY-649P1-dUTP	655/676	100 nmole
MFP-D651-34	MFP™-DY-651-dUTP	656/678	100 nmole
FT-LNT50647-01	Aminoallyl-dUTP - ATTO-647N	663/684	10 µl (1 mM)
FT-LNT50647-02	Aminoallyl-dUTP - ATTO-647N	663/684	5 x 10 µl (1 mM)
MFP-D677-34	MFP™-DY-677-dUTP	673/694	100 nmole
MFP-D682-34	MFP™-DY-682-dUTP	690/709	100 nmole
MFP-D681-34	MFP™-DY-681-dUTP	691/708	100 nmole
MFP-D703-34	MFP™-DY-703-dUTP	705/721	100 nmole
MFP-D731-34	MFP™-DY-731-dUTP	736/760	100 nmole
MFP-D776-34	MFP™-DY-776-dUTP	771/793	100 nmole
MFP-D780-34	MFP™-DY-780-dUTP	782/800	100 nmole
MFP-D781-34	MFP™-DY-781-dUTP	783/800	100 nmole

8. Kits and Reagents for Click-Chemistry

Click-Chemistry was first introduced by K. Berry Sharpless in 2001. It describes a chemical reaction which builds substances by joining small units together. Click-reactions are fast and purposeful with high yields. The most popular click-reaction is azide alkyne Huisgen cycloaddition with Copper (Cu) as catalyst at room temperature. You can use this highly efficient technology for labeling of DNA or RNA via solid-phase synthesis or PCR. Furthermore, it is possible to introduce up to three different modifications onto one position of the same DNA strand. Of course, we offer different kinds of non-fluorescent and fluorescent labels.

8.1 Oligonucleotide labeling by Click-Chemistry

Order#	Product	Ex/Em (nm)	Unit Size
MFPCCK-002	ClickChem-Kit Biotin	N/A	1 Kit
MFPCCK-002-5	ClickChem-Kit Biotin	N/A	5 Kits
MFPCCK-004	ClickChem-Kit Dabcyl	430/none	1 Kit
MFPCCK-004-5	ClickChem-Kit Dabcyl	430/none	5 Kits
MFPCCK-006	ClickChem-Kit MFP-Eterneon™ 350/455	350/455	1 Kit
MFPCCK-006-5	ClickChem-Kit MFP-Eterneon™ 350/455	350/455	5 Kits

MFPCCK-001	ClickChem-Kit Fluorescein	492/518	1 Kit
MFPCCK-001-5	ClickChem-Kit Fluorescein	492/518	5 Kits
MFPCCK-003	ClickChem-Kit TAMRA	546/575	1 Kit
MFPCCK-003-5	ClickChem-Kit TAMRA	546/575	5 Kits
MFPCCMI-003-1	Click-Solution (DMSO/t-Butanol)	-	1 ml
MFPCCMI-003-10	Click-Solution (DMSO/t-Butanol)	-	10 x 1 ml

8.2 Fluorescent azides

Order#	Product	Ex/Em (nm)	Unit Size
MFPCCFA-009-1	Dabsyl Azide	436/none	1 mg
MFPCCFA-009-5	Dabsyl Azide	436/none	5 mg
MFPCCFA-002-1	Dabcyl Azide	453/none	1 mg
MFPCCFA-002-5	Dabcyl Azide	453/none	5 mg
MFPCCFA-002-100	Dabcyl Azide	453/none	100 mg
MFPCCFA-016-1	Dansyl Azide	333/518	1 mg
MFPCCFA-016-5	Dansyl Azide	333/518	5 mg
MFPCCFA-017-1	Pyrene Azide	350/380	1 mg
MFPCCFA-017-5	Pyrene Azide	350/380	5 mg
MFPCCFA-011-1	MFP-Eterneon™-350/455 Azide	350/455	1 mg
MFPCCFA-011-5	MFP-Eterneon™-350/455 Azide	350/455	5 mg
MFPCCFA-011-10	MFP-Eterneon™-350/455 Azide	350/455	10 mg
MFPCCFA-012-1	MFP-Eterneon™-384/480 Azide	384/480	1 mg
MFPCCFA-012-5	MFP-Eterneon™-384/480 Azide	384/480	5 mg
MFPCCFA-012-10	MFP-Eterneon™-384/480 Azide	384/480	10 mg
MFPCCFA-013-1	MFP-Eterneon™-393/523 Azide	393/523	1 mg
MFPCCFA-013-5	MFP-Eterneon™-393/523 Azide	393/523	5 mg
MFPCCFA-013-10	MFP-Eterneon™-393/523 Azide	393/523	10 mg
MFPCCFA-014-1	MFP-Eterneon™-394/507 Azide	394/507	1 mg
MFPCCFA-014-5	MFP-Eterneon™-394/507 Azide	394/507	5 mg
MFPCCFA-014-10	MFP-Eterneon™-394/507 Azide	394/507	10 mg
MFPCCFA-015-1	MFP-Eterneon™-480/635 Azide	480/635	1 mg
MFPCCFA-015-5	MFP-Eterneon™-480/635 Azide	480/635	5 mg
MFPCCFA-015-10	MFP-Eterneon™-480/635 Azide	480/635	10 mg
MFPCCFA-004-1	Fluorescein Azide (5-FAM)	492/518	1 mg
MFPCCFA-004-5	Fluorescein Azide (5-FAM)	492/518	5 mg
MFPCCFA-005-1	Fluorescein Azide (5/6-FAM)	494/519	1 mg
MFPCCFA-005-5	Fluorescein Azide (5/6-FAM)	494/519	5 mg
MFPCCFA-001-1	Fluorescein Azide (6-FAM)	495/517	1 mg
MFPCCFA-001-5	Fluorescein Azide (6-FAM)	495/517	5 mg
MFPCCFA-001-10	Fluorescein Azide (6-FAM)	495/517	10 mg
MFPCCFA-001-100	Fluorescein Azide (6-FAM)	495/517	100 mg
MFP-D480XL-10-1	MFP™-DY-480XL-Azide	500/630	1 mg
MFP-D530-10-1	MFP™-DY-530-Azide	539/561	1 mg
MFPCCFA-007-1	Chromeo™ 546 Azide	545/561	1 mg
MFPCCFA-007-5	Chromeo™ 546 Azide	545/561	5 mg
MFPCCFA-008-5	5-Carboxytetramethylrhodamine Azide (5-TAMRA-Azide)	547/573	5 mg
MFPCCFA-008-100	5-Carboxytetramethylrhodamine Azide (5-TAMRA-Azide)	547/573	100 mg
MFPCCFA-008-1	5-Carboxytetramethylrhodamine Azide (5-TAMRA-Azide)	547/574	1 mg
MFPCCFA-008-10	5-Carboxytetramethylrhodamine Azide (5-TAMRA-Azide)	547/574	10 mg
MFPCCFA-006-1	Chromeo™ 642 Azide	642/660	1 mg
MFPCCFA-006-5	Chromeo™ 642 Azide	642/660	5 mg
MFP-D636-10-1	MFP™-DY-636-Azide	645/671	1 mg
MFP-D682-10	MFP™-DY-682-Azide	690/709	1 mg
MFP-D681-10	MFP™-DY-681-Azide	691/708	1 mg
MFP-D734-10	MFP™-DY-734-Azide	736/759	1 mg
MFP-D800-10	MFP™-DY-800-Azide	777/791	1 mg
MFP-D782-10	MFP™-DY-782-Azide	783/800	1 mg

8.3 Non-fluorescent azides

Order#	Product	Ex/Em (nm)	Unit Size
MFPCCFA-003-1	Biotin Azide	N/A	1 mg
MFPCCFA-003-5	Biotin Azide	N/A	5 mg
MFPCCFA-003-10	Biotin Azide	N/A	10 mg
MFPCCFA-003-100	Biotin Azide	N/A	100 mg
MFPCCL-001-10	NHS-PEG4-Azide	N/A	10 mg

MFPCCL-001-5	NHS-PEG4-Azide	N/A	5 mg
MFPCCL-002-10	PEG24-Azide	N/A	10 mg
MFPCCL-002-5	PEG24-Azide	N/A	5 mg
MFPCCL-003-10	PEG8-Azide	N/A	10 mg
MFPCCL-003-5	PEG8-Azide	N/A	5 mg
MFPCCL-004-10	HO-PEG2-Azide	N/A	10 mg
MFPCCL-004-5	HO-PEG2-Azide	N/A	5 mg
MFPCCL-005-10	H_2N-PEG8-Azide	N/A	10 mg
MFPCCL-005-5	H_2N-PEG8-Azide	N/A	5 mg
MFPCCL-006-10	PEG7-Bis-Azide	N/A	10 mg
MFPCCL-006-5	PEG7-Bis-Azide	N/A	5 mg
MFPCCL-010-10	Mal-PEG3-Azide	N/A	10 mg
MFPCCL-010-5	Mal-PEG3-Azide	N/A	5 mg
MFPCCL-011-10	H_2N-PEG3-Azide	N/A	10 mg
MFPCCL-011-5	H_2N-PEG3-Azide	N/A	5 mg

For more reagents related to Click-Chemistry, please visit our website www.mobitec.com.

9. Contact and Support

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Bulk quantities of dyes not listed in this brochure, for instance, cyanine dyes, are negotiable!