mFluor™ Green 630 SE

Catalog number: 1168
Unit size: 1 mg

Component	Storage	Amount (Cat No. 1168)
mFluor™ Green 630 SE	Freeze (< -15 °C), Minimize light exposure	1 mg

OVERVIEW

Advances in spectral flow cytometers have expanded applications and capabilities beyond conventional flow cytometry. Now with spectral flow cytometry analysis, researchers and scientists can investigate an increasing number of molecules of interest. However, the potential of spectral flow cytometry is severely limited by the availability of fluorescent labels and readouts. AAT Bioquest's mFluor™ dyes are developed for multicolor flow cytometry-focused applications, in particular, for spectral fluorescence flow cytometry. mFluor™ Green 630 dye can be well excited with green laser at 532 nm. It has a huge Stokes shift with emission ~630 nm. mFluor™ Green 630 dyes are water-soluble, and the protein conjugates prepared with mFluor™ Green 630 dyes are well excited at 532 nm to give red fluorescence. mFluor™ Green 630 dye and conjugates are excellent green laser reagents for flow cytometry detections. Compared to RPE, mFluor™ Green 630 dyes are much more photostable, making them readily available for fluorescence imaging applications while it is very difficult to use RPE conjugates for fluorescence imaging applications due to the rapid photobleaching of RPE conjugates. It is also a unique fluorochrome for spectral flow cytometry since there are very few existing dyes that have this spectral profile.

PREPARATION OF STOCK SOLUTIONS

Unless otherwise noted, all unused stock solutions should be divided into single-use aliquots and stored at -20 °C after preparation. Avoid repeated freeze-thaw cycles

Protein stock solution (Solution A)

Mix 100 µL of a reaction buffer (e.g., 1 M sodium carbonate solution or 1 M phosphate buffer with pH ~9.0) with 900 µL of the target protein solution (e.g. antibody, protein concentration >2 mg/mL if possible) to give 1 mL protein labeling stock solution.

Note: The pH of the protein solution (Solution A) should be 8.5 ± 0.5. If the pH of the protein solution is lower than 8.0, adjust the pH to the range of 8.0-9.0 using 1 M sodium bicarbonate solution or 1 M pH 9.0 phosphate buffer.

Note: The protein should be dissolved in 1X phosphate buffered saline (PBS), pH 7.2-7.4. If the protein is dissolved in Tris or glycine buffer, it must be dialyzed against 1X PBS, pH 7.2-7.4, to remove free amines or ammonium salts (such as ammonium sulfate and ammonium acetate) that are widely used for protein precipitation.

Note: Impure antibodies or antibodies stabilized with bovine serum albumin (BSA) or gelatin will not be labeled well. The presence of sodium azide or thimerosal might also interfere with the conjugation reaction. Sodium azide or thimerosal can be removed by dialysis or spin column for optimal labeling results.

Note: The conjugation efficiency is significantly reduced if the protein concentration is less than 2 mg/mL. For optimal labeling efficiency the final protein concentration range of 2-10 mg/mL is recommended.

mFluor™ Green 630 SE stock solution (Solution B)

Add anhydrous DMSO into the vial of mFluor™ Green 630 SE to make a 10 mM stock solution. Mix well by pipetting or vortex.

Note: Prepare the dye stock solution (Solution B) before starting the conjugation. Use promptly. Extended storage of the dye stock solution may reduce the dye activity. Solution B can be stored in freezer for two weeks when kept from light and moisture. Avoid freeze-thaw cycles.

SAMPLE EXPERIMENTAL PROTOCOL

This labeling protocol was developed for the conjugate of Goat anti-mouse IgG with mFluor™ Green 630 SE. You might need further optimization for your particular proteins.

Note: Each protein requires distinct dye/protein ratio, which also depends on the properties of dyes. Over labeling of a protein could detrimentally affects its binding affinity while the protein conjugates of low dye/protein ratio gives reduced sensitivity.

Run conjugation reaction

1. Use 10:1 molar ratio of Solution B (dye)/Solution A (protein) as the starting point: Add 5 µL of the dye stock solution (Solution B, assuming the dye stock solution is 10 mM) into the vial of the protein solution (95 µL of Solution A) with effective shaking. The concentration of the protein is ~0.05 mM assuming the protein concentration is 10 mg/mL and the molecular weight of the protein is ~200KD.

   Note: We recommend to use 10:1 molar ratio of Solution B (dye)/Solution A (protein). If it is too less or too high, determine the optimal dye/protein ratio at 5:1, 15:1 and 20:1 respectively.

2. Continue to rotate or shake the reaction mixture at room temperature for 30-60 minutes.

Purify the conjugation

The following protocol is an example of dye-protein conjugate purification by using a Sephadex G-25 column.

1. Prepare Sephadex G-25 column according to the manufacture instruction.
2. Load the reaction mixture (From "Run conjugation reaction") to the top of the Sephadex G-25 column.
3. Add PBS (pH 7.2-7.4) as soon as the sample runs just below the top resin surface.
4. Add more PBS (pH 7.2-7.4) to the desired sample to complete the column purification. Combine the fractions that contain the desired dye-protein conjugate.

   Note: For immediate use, the dye-protein conjugate need be diluted with staining buffer, and aliquoted for multiple uses.

   Note: For longer term storage, dye-protein conjugate solution need be concentrated or freeze dried.

EXAMPLE DATA ANALYSIS AND FIGURES

Characterize the Desired Dye-Protein Conjugate

The Degree of Substitution (DOS) is the most important factor for characterizing dye-labeled protein. Proteins of lower DOS usually have

weaker fluorescence intensity, but proteins of higher DOS tend to have reduced fluorescence too. The optimal DOS for most antibodies is recommended between 2 and 10 depending on the properties of dye and protein. The following steps are used to determine the DOS of mFluor™ Green 630 SE labeled proteins.

Measure absorption

To measure the absorption spectrum of a dye-protein conjugate, it is recommended to keep the sample concentration in the range of 1-10 μM depending on the extinction coefficient of the dye.

Read OD (absorbance) at 280 nm and dye maximum absorption (λmax = 537 nm for mFluor™ Green 630 dyes)

For most spectrophotometers, the sample (from the column fractions) need be diluted with de-ionized water so that the OD values are in the range of 0.1 to 0.9. The O.D. (absorbance) at 280 nm is the maximum absorption of protein while 537 nm is the maximum absorption of mFluor™ Green 630 SE. To obtain accurate DOS, make sure that the conjugate is free of the non-conjugated dye.

Calculate DOS

You can calculate DOS using our tool by following this link: https://www.aatbio.com/tools/degree-of-labeling-calculator

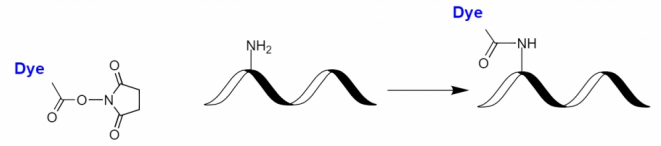

Figure 1. Fluorescent dye NHS esters (or succinimidyl esters) are the most popular tool for conjugating dyes to a peptide, protein, antibody, amino-modified oligonucleotide, or nucleic acid. NHS esters react readily with the primary amines ($R\text{-}NH_2$) of proteins, amine-modified oligonucleotides, and other amine-containing molecules. The resulting dye conjugates are quite stable.

DISCLAIMER

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