

**mFluor™ Violet 610 SE**

Catalog number: 1156  
Unit size: 1 mg

Component	Storage	Amount (Cat No. 1156)
mFluor™ Violet 610 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. These dyes have large Stokes Shifts, and can be well excited by the laser lines of flow cytometers (e.g., 350 nm, 405 nm, 488 nm and 633 nm). mFluor™ Violet 610 dyes are well excited with the Violet laser with a red emission ~610 nm. These spectral characteristics make them very unique labeling dyes for spectral fluorescence flow cytometric applications. mFluor™ Violet 610 SE is reasonably stable and shows good reactivity and selectivity with protein amino groups. mFluor™ Violet 610 SE provides a convenient tool to label monoclonal, polyclonal antibodies or other proteins (>10 kDa) for flow cytometric applications with the violet laser excitation.

**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™ Violet 610 SE stock solution (Solution B)**

Add anhydrous DMSO into the vial of mFluor™ Violet 610 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™ Violet 610 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™ Violet 610 SE labeled proteins.

### Measure absorption

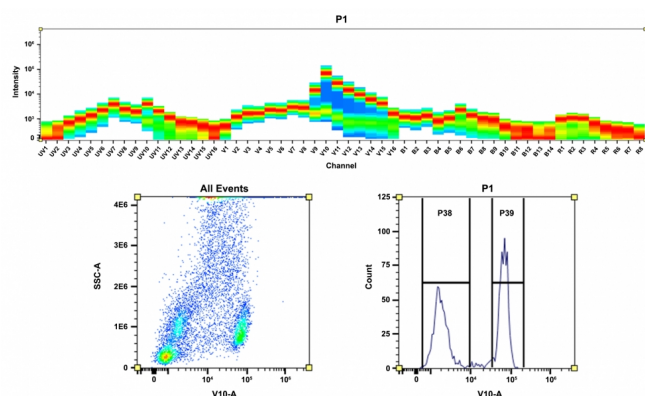
To measure the absorption spectrum of a dye-protein conjugate, it is recommended to keep the sample concentration in the range of 1-10  $\mu$ M depending on the extinction coefficient of the dye.

Read OD (absorbance) at 280 nm and dye maximum absorption ( $\lambda_{max}$  = 594 nm for mFluor™ Violet 610 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 594 nm is the maximum absorption of mFluor™ Violet 610 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. Top)** Spectral pattern was generated using a 4-laser spectral cytometer. Spatially offset lasers (355 nm, 405 nm, 488 nm, and 640 nm) were used to generate four distinct emission profiles, then, when combined, yielded the overall spectral signature. **Bottom)** Flow cytometry analysis of whole blood cells stained with CD4-mFluor™ Violet 610 conjugate. The fluorescence signal was monitored using a Cytek® Aurora spectral flow cytometer in the mFluor™ Violet 610 specific V10-A channel.

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