

Monomeric Cyanine Nucleic Acid Stains

Table 1. Contents and storage information.

| Material | Amount | Concentration | Storage | Stability |
|---------------------------------------|--------|-----------------------|---|---|
| Monomeric cyanine nucleic acid stains | 1 mL * | 1 mM solution in DMSO | <ul style="list-style-type: none"> • ≤-20°C • Desiccate • Protect from light | When stored as directed, products should be stable for 6–12 months. |

* We recommend aliquotting the solution into several containers for storage.

Approximate absorption/fluorescence emission maxima: See Table 2.

Introduction

Invitrogen's monomeric cyanine nucleic acid stains (Table 2) allow ultrasensitive detection of double-stranded nucleic acids. They are ideally suited for nuclear staining in flow cytometry¹ and fluorescence microscopy² applications in fixed cells.

Table 2. Spectral characteristics of monomeric cyanine nucleic acid stains.

| Name | Catalog # | MW * | Abs † (nm) | $\epsilon_{\max} \ddagger$ (cm ⁻¹ M ⁻¹) | Em † (nm) | QY§ | Excitation Light Source (nm) |
|-----------|-----------|------|------------|--|-----------|------|------------------------------|
| PO-PRO™-1 | P3581 | 579 | 435 | 50,100 | 455 | 0.39 | He-Cd 442 |
| BO-PRO™-1 | B3583 | 595 | 462 | 58,100 | 481 | 0.16 | He-Cd 442 |
| YO-PRO®-1 | Y3603 | 629 | 491 | 52,000 | 509 | 0.44 | Ar 488 |
| TO-PRO®-1 | T3602 | 645 | 515 | 62,800 | 531 | 0.25 | Ar 514 |
| JO-PRO™-1 | J11373 | 630 | 530 | 94,400 | 546 | 0.38 | Nd: YAG 532 |
| PO-PRO™-3 | P3585 | 605 | 539 | 87,900 | 567 | 0.57 | He-Ne 543 |
| BO-PRO™-3 | B3587 | 621 | 575 | 80,900 | 599 | 0.62 | Kr 568 |
| YO-PRO®-3 | Y3607 | 655 | 612 | 100,100 | 631 | 0.16 | He-Ne 594 |
| TO-PRO®-3 | T3605 | 671 | 642 | 102,000 | 661 | 0.11 | He-Ne 633 |
| TO-PRO®-5 | T7596 | 697 | 748 | 108,500 | 768 | ND | |

* Molecular weight. † Absorption and fluorescence emission maxima. ‡ Molar extinction coefficient. § Fluorescence quantum yield determined relative to fluorescein in 0.1 M NaOH (QY = 0.92). Abs, Em, ϵ_{\max} and QY determined for DNA complexes in 10 mM Tris, 1 mM EDTA, 50 mM NaCl, pH 7.4. The spectral appearance of some dyes may be slightly altered inside cells. **ND** = Not determined.

Guidelines For Use

Allow all solutions to warm to room temperature and mix thoroughly before use.

Spectral Characteristics

The fluorescence spectra of the monomeric cyanine nucleic acid stains cover the entire visible wavelength range, as shown in Figure 1 and summarized in Table 2. The table also lists optical filter sets and laser line sources suitable for excitation and detection of these dyes. These dyes may also be used with ultraviolet trans- or epi-illuminator excitation sources. As shown in Figure 2, the fluorescence excitation spectrum of DNA-bound TO-PRO[®]-1 dye has a short-wavelength peak at about 275 nm. The maximum amplitude of this peak is about 25% relative to the main peak at 515 nm. PO-PRO[™]-1, BO-PRO[™]-1 and YO-PRO[®]-1 dyes exhibit similar ultraviolet excitation peaks. The monomeric cyanine nucleic acid stains exhibit large degrees of fluorescence enhancement upon binding to DNA (or RNA), varying from 400- to 1800-fold for the “1-series” and 20- to 200-fold for the “3-series.” Consequently, the fluorescence of unbound dye is negligible under most experimental detection conditions.

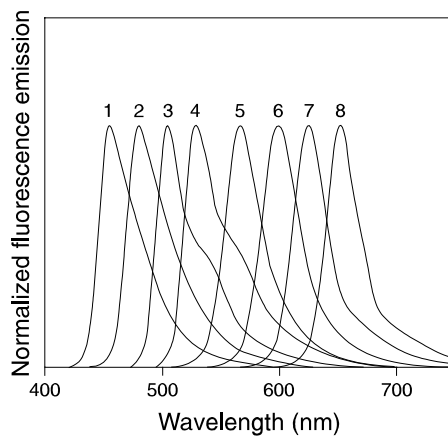


Figure 1. The normalized emission spectra of Invitrogen's monomeric cyanine nucleic acid stains bound to calf thymus DNA. The peaks correspond to the emission of 1) PO-PRO[™]-1; 2) BO-PRO[™]-1; 3) YO-PRO[®]-1; 4) TO-PRO[®]-1; 5) PO-PRO[™]-3; 6) BO-PRO[™]-3; 7) YO-PRO[®]-3; and 8) TO-PRO[®]-3.

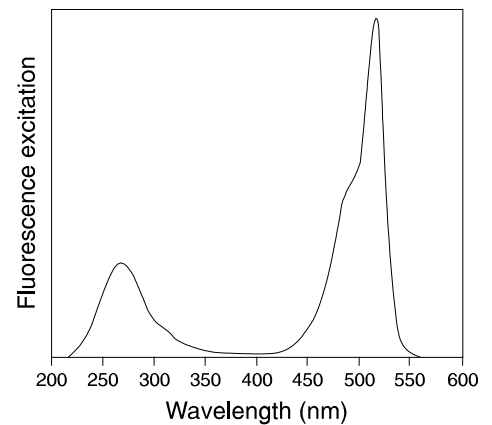


Figure 2. Fluorescence excitation spectrum of TO-PRO[®]-1 dye complexed with DNA at a ratio of 1 dye:50 base pairs.

References

1. Cytometry 15, 129 (1994);
2. Cell 75, 373 (1993).

Product List Current prices may be obtained from our website or from our Customer Service Department.

| Cat # | Product Name | Unit Size |
|--------|--|-----------|
| B3583 | BO-PRO™-1 iodide (462/481) *1 mM solution in DMSO* | 1 mL |
| B3587 | BO-PRO™-3 iodide (575/599) *1 mM solution in DMSO* | 1 mL |
| J11373 | JO-PRO™-1 iodide (530/546) *1 mM solution in DMSO* | 1 mL |
| P3581 | PO-PRO™-1 iodide (435/455) *1 mM solution in DMSO* | 1 mL |
| P3585 | PO-PRO™-3 iodide (539/567) *1 mM solution in DMSO* | 1 mL |
| T3602 | TO-PRO®-1 iodide (515/531) *1 mM solution in DMSO* | 1 mL |
| T3605 | TO-PRO®-3 iodide (642/661) *1 mM solution in DMSO* | 1 mL |
| T7596 | TO-PRO®-5 iodide (745/770) *1 mM solution in DMSO* | 1 mL |
| Y3603 | YO-PRO®-1 iodide (491/509) *1 mM solution in DMSO* | 1 mL |
| Y3607 | YO-PRO®-3 iodide (612/631) *1 mM solution in DMSO* | 1 mL |

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