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Propidium Iodide (PI)

A membrane-impermeant nucleic acid intercalator. The dye is commonly used to selectively stain dead cells in a mixed live-dead population and also used as a counterstain in multicolor fluorescent assays.



Product attributes

Probe cellular localization	Nucleus & cytoplasm
Assay type/options	DNA content/cell cycle profiling by flow cytometry, Live/dead discrimination, Long term staining (24-72h), No-wash staining, Real-time imaging, Tissue staining
Detection method/readout	Fluorescence microscopy, Flow cytometry
Cell permeability	Membrane impermeant
Apoptosis/viability marker	Dead cell stain
Colors	Red
Storage Conditions	Store at 2 to 8 °C, Protect from light
CAS number	25535-16-4
Compound MW	668.4
Excitation/Emission	493/636 nm (without DNA), 535/617 nm (with DNA)

Product Description

Propidium iodide (PI) is a cell impermeable nucleic acid intercalating dye. Because PI is excluded from viable cells, it often used to selectively stain dead cells in a mixed live-dead cell population. PI is often used as a counterstain in multicolor fluorescence applications.

Propidium Iodide (PI) Products

Propidium Iodide Products	Catalog Number	Unit Size	Format
Propidium Iodide	40016	100 mg	Orange red solid
Propidium Iodide, 1 mg/mL in Water	40017	10 mL	Orange/red solution
Propidium Iodide, 50 ug/ml in Buffer	40048	2 mL	Orange/red solution

After entering cells and binding to DNA and RNA, the fluorescence of PI is enhanced 20- to 30-fold. PI can be used in flow cytometry and fluorescence microscopy. PI is also utilized as a counterstain in multicolor fluorescent imaging, but nuclear-specific staining requires digestion of cellular RNA.

Find the Right Stain for Your Application

PI is dead cell specific in all cell types, including mammalian cells, bacteria and yeast. PI can be used to distinguish necrotic or late apoptotic cells with damaged plasma membranes from viable cells or early apoptotic cells with intact cell membranes. Ethidium Homodimer I is the most common alternative to PI; the high affinity of EthD-I permits the use of a lower dye concentration and no-wash staining. Biotium developed Ethidium Homodimer III, as a superior alternative to EthD-I. The absorption and emission spectra are similar, but EthD-III is 45% brighter. Biotium also offers other dead-cell stains in other colors and with other beneficial properties such as Live-or-Dye NucFix™ Red which, unlike PI, is a fixable dead-cell stain. See our Cellular Stains Selection Guide and Cellular Stains Table for more information. Learn more about PI and other dead-cell specific stains.

Biotium also offers other live-cell specific stains in other colors and with other beneficial properties. Such as NucSpot® Live Cell Nuclear Stains, which are cell-membrane permeable DNA dyes that specifically stain nuclei in live or fixed cells. They have excellent specificity for DNA without the need for a wash step, and they have low toxicity for live cell imaging. Also see our NucSpot® Nuclear Stains for bright and specific nuclear counterstaining, available from green to near-IR.

Cell Viability & Apoptosis Assays

Biotium offers a wide-selection of assay kits for cell viability and cell death for microplate reader, flow cytometry, or fluorescence microscopy. PI and CF®488A-Annexin V are available as a convenient kit for staining apoptotic cells with green fluorescence and necrotic cells with red fluorescence. Ethd-III component of several combination viability assay kits for detecting both live and dead cells in the same population, such as our Viability/Cytotoxicity Assay Kit for Animal Cells and our Viability/Cytotoxicity Assay Kit for Bacteria. Learn more about our Cell Viability & Apoptosis Assays.

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