

DNA/RNA probes

Nucleic acids are essential biomolecules in cells, bearing the genetic information. The visualization of nucleic material in cell nucleus was initiated by conventional dyes, like Hoechst counterstains still used in cytogenetics. With the development of genetic, fluorescent dyes were needed to gain detection sensitivity, to discriminate nucleic acid materials, and to detect nucleic acids in solutions and electrophoresis (like with the popular Ethidium Bromide). Beside these conventional stains, FluoProbes® provides derivatives (i.e. reduced form) and new fluorescent probes (including our ADyNA dyes), to fit a lot of applications.

Related products :

Fluorescent labels to build specific nucleic probes => see section B51

FRET labels to build specific nucleic probes => see section B85

Labeled nucleotides => see sections D136-D137

DNA/RNA staining for gel electrophoresis and blotting => see section D86

Tools for Cytogenetics => see page D136

Selection guide

◆ Detection of DNA/RNA in cells

Counterstaining of cell nucleus for cytogenetic continues to use conventional dyes, as Hoechst and DAPI counterstains (see also other specific probes in section IV.C). Fluorescent dyes were then proposed to gain detection sensitivity, with the popular **Propidium iodide**, and for specific applications notably with **Ethidium derivatives**, **7-AAD** and **Hydroxystilbamidine**. Our new **ADyNA™** dyes, with promising findings, will probably help the research community.

◆ Detection of DNA/RNA in solutions

Nucleic acid absorb at 260 nm, but absorbance measurement is not sensitive and require purified DNA. So, Fluorescent DNA dyes provide ideal tools suiting the rising R&D needs for higher sensitivity with always smaller samples. I.e. DNA should be quantitated in a single drosophile eye, or at very low concentration in foods (OEM), or in very complex samples (forensics) ! FluoProbes® recommends the new **ADyNA™515** dye for superior sensitivity, alternative to Hoechst33258 and EthBr. Also, **Green I stain #72571A**, provides in the 0.1 ng-100 µg/ml range a cost effective alternative to PicoGreen® (in the 0.1-250 pg/ml range).

◆ DNA/RNA Detection in gels (electrophoresis)

SDS-PAGE has become a routine analysis technique in most labs, and 2D electrophoresis, the standard technique for proteomics. Fluorescence allows unsurpassed detection sensitivity, especially with Gel Red®, a superior and safer alternative to Ethidium bromide (see page D86).

The following table summarize main dyes features and gives guidelines.

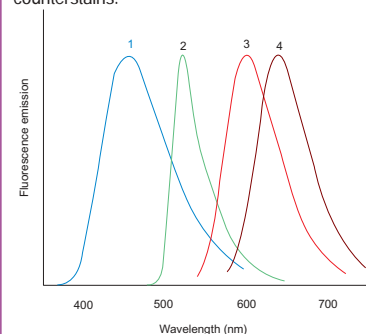
Product number	Type	Max λ_{abs} (nm)	EC (M-1 cm-1)	Max λ_{em} ds DNA	Living cells	Dead cells	In slides	FCM	In solution	In gels	
BB9951	ADyNA™515	Intercal	485	140 000	515	Y	Y	Y-	Y	Y	Y+
BB9921	ADyNA™531	Intercal	490	179 000	531	Y	Y+	Y-	Y	Y	Y-
BB9961	ADyNA™545	Intercal.	515	68 500	545	Y	Y+	Y-	Y-	Y	Y-
32790A	Ethidium Bromide	Intercal	518	5 200	605	Y-	Y+			Y	Y+
52492A	DihydroEthidium	Intercal	518	14 000	605	-	Y		Y		
25810A	EthD-1	Intercal	528	7 000	617	-	Y+		Y+	Y	Y
67125A	EthD-2	Intercal	535	8 000	624	-	Y				
48256A	Ethidium Monoazide	Intercal	562	5 400	625	Y-	Y				
31238B	PI	Intercal	535	5 400	617	-	Y+	Y	Y+		Y
72571A	Green I dye	Intercal.	UV,497			520	N	Y		Y+	Y+
371867	DAPI	MGB/AT	368	21 000	461	Y	Y+	Y+	Y		Y
66034A	DAPI dilactate	MGB	368	21 000	461	Y	Y	Y+	Y		
61248A	Hoechst33258	MBG	352	40 000	461	Y	Y+			Y	
BB1340	Hoechst33342	MBG	350	45 000	461	Y	Y+			Y	
05920D	Acridine Orange	Other	458	53 000	525	Y	Y		Y	Y	
98990A	Acridine Homodimer	O/AT	431		498	N	Y	Y			
132303	7-AAD	O/GC	546	25 000	647	Y-	Y+	Y+	Y		
155821	ACMA	O/AT	412	8 200	471						
97384A	LDS 751	Other	543	46 000	712	Y	Y	Y			
40766A	Hydroxystilbamidine	O/AT	385		Variable	Y	Y	Y			

Technical tip

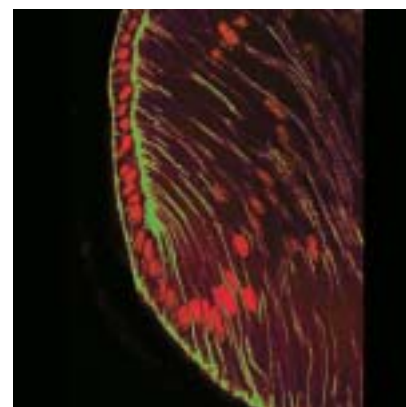
DNA/RNA probe type

◆ **Intercalating fluorescent dyes** show changes in fluorescence emission on intercalating with DNA and/or RNA. The 3 most popular are EthBr, EthD-1 and PI that can be used to compare and quantitate DNA in solution, on gels and in cells (I.O3). They can be used in combination with fluorescein-based probes (such as calcein, CMFDA or BCECF) for two-colours applications. Now, FluoProbes® is pleased to provide new DNA/RNA stains, the ADyNA™ dyes (I.O1).

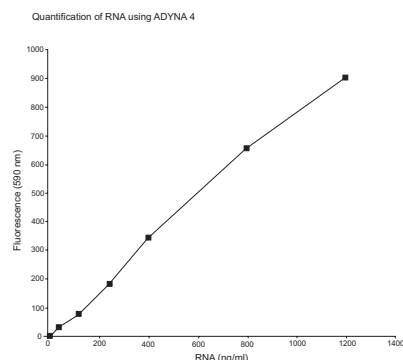
◆ **DNA minor-groove binders (MGB)** change their fluorescence properties upon DNA binding (I.O4,5). They are mainly used as counterstains.



Fluorescence emission spectra of DNA-bound
1) Hoechst 33258, 2) acridine orange, 3) ethidium bromide and 4) 7-aminoactinomycin D



Intercal. : Intercalator
MGB : Minor-groove binder
O : Other DNA interaction type
AT or GC : Selectivity
Y : Yes
Y+ widely used and recommended
Y- (of second importance, few documented, or not recommended)



Intercalating ADyNA fluorescent dyes

ADyNA™ stains for DNA/RNA

FluoProbes® ADyNA™ dyes are absolutely non fluorescent in absence of nucleic acids, but intercalate immediately when in presence of nucleotides, becoming highly fluorescent. A strong shift allows to discriminate dsDNA binding from ssDNA binding. Dyes cover spectra from 570 to 610 nm ; all with sensitivity below 100 pg/ml. Applications are various, including :

- ◆ Detection and quantification of nucleic acids in solutions
- ◆ Detection of nucleic acids in cells
- ◆ Staining for nucleic acid electrophoresis

References :

1) Bunkenborg J. et. al. ; Concerted intercalation and minor groove recognition of DNA by a homodimeric thiazole orange dye ; Bioconjugate Chem. 11 (2000), p. 861-867.

2) Timcheva I. et al. ; Fluorescence spectral characteristics of novel asymmetric monomethine cyanine dyes in nucleic acid solutions ; FEBS Letters 405 (1997), p. 141-144.

abs em. ADyNA™515, 1 mM DMSO sol

$\lambda_{exc.}/\lambda_{em.}$ (dsDNA) : 485/515 nm ; EC : 140 000 M⁻¹cm⁻¹
QY>0.7

$\lambda_{exc.}/\lambda_{em.}$ (ssDNA) : 485/572 nm
Sensitivity < 100 pg/ml.

Staining in gel electrophoresis.

Description	Cat.#	Qty
ADyNA™515, 1 mM DMSO sol	FP-BB9951	200 µl

abs em. ADyNA™545, 1 mM DMSO sol

$\lambda_{exc.}/\lambda_{em.}$ (dsDNA) : 515/545 nm ; EC : 68 500 M⁻¹cm⁻¹
QY>0.25

$\lambda_{exc.}/\lambda_{em.}$ (ssDNA) : 515/610 nm
Sensitivity : < 100 pg/ml.

Cell permeable and may be used in many cell biology.

Description	Cat.#	Qty
ADyNA™545, 1 mM DMSO sol	FP-BB9961	200 µl

Ethidium and Propidium Iodides

EtBr and PI are phenanthridinium DNA intercalators used in fluorescence microscopy, confocal laser-scanning microscopy, flow cytometry and fluorometry (excited with mercury- or xenon-arc lamps or with the argon-ion laser). One dye binds in a sequence-random manner per 4–5 base pairs of DNA, eliciting a 30-40 fold fluorescence enhancement. Both are membrane impermeant, and bind also to RNA.

Several derivatives are available, dedicated to specific applications, including for example Ethidium homodimer-1 and Ethidium homodimer-2 which strongly bind to dsDNA, ssDNA, RNA and oligonucleotides

abs. em. Ethidium Bromide (Eth br)

$C_{21}H_{20}BrN_3$ MW : 394.32

Soluble in water, DMSO

DO NOT FREEZE

Store at 4°C

Potent Mutagen

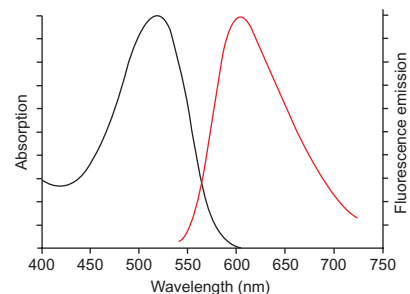
$\lambda_{exc.}/\lambda_{em.}$ (water) : 493/620 nm ; EC : 5 200 $M^{-1}cm^{-1}$

$\lambda_{exc.}/\lambda_{em.}$ (dsDNA) : 518/605 nm ; EC : 5 200 $M^{-1}cm^{-1}$

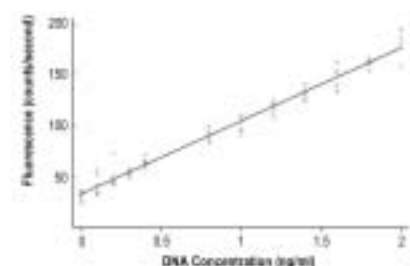
QY : ca 0.15

- ◆ The most commonly used dye for DNA and RNA detection in gels. It binds to single-double- and triple-stranded DNA, to protein–DNA complex in bandshift assays, and also RNA.
- ◆ Also suits for DNA detection in 250 ng-20 µg/ml solutions (distinguishes smaller differences than Hoechst33258).
- ◆ Has been used in cells for some applications, but it is noticeable that Eth br is cell-impermeant and toxic to cells.

Description	Cat.#	Qty
Ethidium Bromide (Eth br)	FP-06022A	5 g x 1 g
	FP-32790A	5 ml at 0.625 mg/ml in dropper



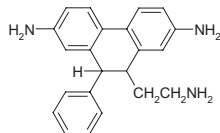
Absorption and emission spectra of Ethidium bromide (FP-06022).



The solution is recommended to reduce exposure to this mutagenic product.

See also
Gel Red® for DNA electrophoresis staining (more sensitive and not toxic).
Evagreen™ for DNA labeling in RT-PCR (the most sensitive stain).

Other green DNA stain #72571A on inquire.



abs em. Dihydroethidium

(also called Hydroethidium, Hydroethidine)

Store at -20°C and protect from light

$C_{21}H_{21}N_3$ MW : 315.42

$\lambda_{exc.}/\lambda_{em.}$ (Hydrolyzed, dsDNA) : 518/605 nm

$\lambda_{exc.}/\lambda_{em.}$ (free) : 355 nm/none ; EC : 14 000 $M^{-1}cm^{-1}$

Dihydroethidium is the chemically reduced form of the commonly used DNA dye ethidium bromide. Dihydroethidium can passively cross the membrane of living cells and not bind to nucleic acids. It is itself weakly fluorescent in the blue range ($\lambda_{exc.}/\lambda_{em.}$: 355/420 nm) in cytoplasm, where it is re-oxidized by intracellular enzymes. Upon DNA intercalation, it becomes red fluorescent. The probe is useful to detect oxidative activities in viable cells, including respiratory burst in phagocytes, oxidation in resting leukocytes, and to detect multidrug-resistant cancer cells.

References : J. Immunol. Meth., 170, 117(1994); FEMS Microbiol. Lett. 101, 173(1992); J. Histochem. Cytochem. 34, 1109(1986); FEMS Microbiol. Lett. 122, 187(1994).

Description	Cat.#	Qty
Dihydroethidium	FP-52492A	25 mg



A B C D
Nucleus in a cell undergoing apoptosis : healthy cell (A), early apoptosis (B), advanced apoptosis (C), late apoptosis (D).

abs em. Ethidium homodimer 1 (EthD-1 or EtDi) 2 mM DMSO solution

Soluble in DMSO

Store at 4°C

$C_{46}H_{50}Cl_4N_8$ MW : 856.78

$\lambda_{exc.}$ (in H_2O , no DNA) : 493 nm ; EC : 9 100 $M^{-1}cm^{-1}$

$\lambda_{exc.}/\lambda_{em.}$ (with DNA) : 528/617 nm ; EC : 7 000 $M^{-1}cm^{-1}$

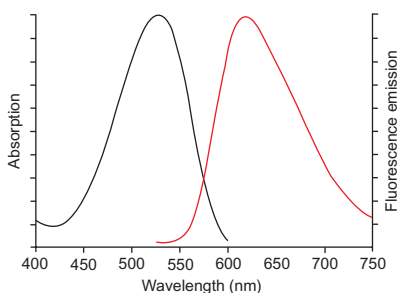
Absorption and fluorescence emission spectra of ethidium homodimer-1 bound to DNA. Ethidium homodimer is a high affinity fluorescent nucleic acid stain (1000 times that of Ethbr). It binds to both DNA and RNA in a sequence-independent manner and with a >30-fold fluorescence enhancement. The DNA binding of each Ethidium Homodimer covers four base pairs and is believed to occur by intercalation. Because the dye is highly positively charged, and of large size, it's too polar and can not cross cell membranes to stain living cells. It can be excited by the argon-ion laser (FCM) and with standard UV transilluminators. FluoProbes® Ethidium homodimer is of highest purity, devoid of inorganic salts that are found in other suppliers, and lowers the needed amount and thus background.

Applications :

It is very useful to detect nucleic acids in solution, or cells with compromised membranes. When used as a viability indicator, EthD-1 typically does not require a washing step because very low concentrations are needed (safer than Eth,br and PI). DNA can be pre-stained with dye before separation by gel electrophoresis. Detection sensitivity of 30–60 picograms DNA per band on polyacrylamide gels using a confocal laser-based scanning system. Has also been used to detect DNA in solution.

References : Biochemistry 17, 5078(1978) ; Anal. Biochem. 94, 259(1979) ; Bioorg. Med. Chem. 3, 701(1995) ; Nucleic Acids Res. 23, 2413(1995).

Description	Cat.#	Qty
Ethidium homodimer 1	FP-25810A	1 mg
	FP-AT758A	0.5 ml 2 mM in DMSO
	FP-BW63A	0.5 ml 2 mg/ml in water



abs em. Ethidium homodimer-2 (EthD-2)

$C_{51}H_{60}I_4N_8$ MW : 1292.72

Soluble in water (DMSO recommended).

Store at -20°C and product from light

$\lambda_{exc.}/\lambda_{em.}$ (H₂O) : 498 nm/weak ; EC : 10 800 M⁻¹cm⁻¹

$\lambda_{exc.}/\lambda_{em.}$ (DNA bound, H₂O) : 535/624 nm ;

EC : 8 000 M⁻¹cm⁻¹

Similar properties to EthD-1, but with twice the DNA affinity and twice fluorescence when bound to DNA than bound to RNA. Excited by the 488 nm spectral line of the argon-ion laser. Membrane impermeant.

Description	Cat.#	Qty
Ethidium homodimer-2 (EthD-2)	FP-67125A	200 µl

abs em. Ethidium monoazide, Bromide

(Ethidium bromide monoazide, EMA)

$C_{21}H_{18}BrN_5$ MW : 420.32

Soluble in DMF, or ethanol.

Store at 4°C

$\lambda_{exc.}/\lambda_{em.}$ (free in water) : 462/625 nm (weak fluorescent) ;

EC : 5 400 M⁻¹cm⁻¹

$\lambda_{exc.}/\lambda_{em.}$ (with DNA) : 504/600 nm

Being relatively impermeant to living cells, it selectively labels DNA in dead cells, even in presence of mixed living cells. Upon photolysis, it binds covalently to nucleic acids (crosslink) in solution and in cells with compromised membranes⁽¹⁾. One can then wash and fix the cell preparation and examine it by microscopy, immunohistochemistry, fluorescence plate reader or flow cytometry. A major advantage of this method is that researchers can avoid extensive manipulation of live pathogenic organisms⁽⁶⁾. A particularly useful application of the dye is assays of dead cells in living cell populations, and determine the viability of the cells at a defined time (that of photolysis). The dye has been used to "footprint" drug binding sites on DNA,⁽²⁾ to modify plasmid DNA^(3,4) and to determine hemopoietic cell phenotype, function and position in the cell cycle⁽⁵⁾. It has also been used in two colour analysis.

References : 1) J. Mol. Biol. 92, 319(1975) ; 2) Euro. J. Biochem. 182, 437(1989) ; 3) J. Biol. Chem. 257, 13205(1982) ; 4) J. Biol. Chem. 259, 11090(1984) ; 5) Cytometry 11, 610(1990) ; 6) Cytometry, 12, 133(1991) ; 7) for excitation/emission of the dye before and after binding to DNA/ RNA and photolysis, please see ref : Nucleic Acids Res. 5, 4891(1978).

Description	Cat.#	Qty
Ethidium monoazide, Bromide	FP-48256A	5 mg

abs em. Propidium iodide (PI)

$C_{27}H_{34}I_2N_4$ MW : 668.41

Soluble in water (more than Eth,br), DMSO

Store at 4°C

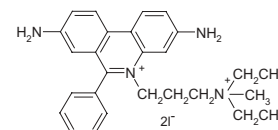
$\lambda_{exc.}/\lambda_{em.}$ (no DNA, water) : 493\636 nm ; EC : 5 400 M⁻¹cm⁻¹

$\lambda_{exc.}/\lambda_{em.}$ (DNA-bound) : 535/617 nm

Potent Mutagen

Propidium Iodide is a membrane-impermeant nucleic acid intercalator. The dye is commonly used to selectively stain dead cells in a cell population and also used as a nuclear or chromosome counterstain in multicolour fluorescent imaging with Fluorescein. Can be excited by the argon-ion laser.

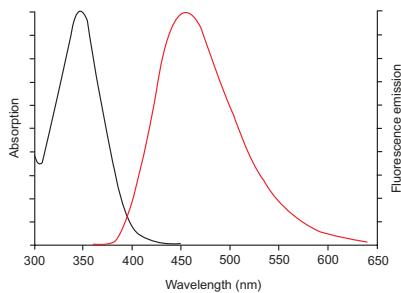
Description	Cat.#	Qty
Propidium iodide (PI)	FP-31238B	100 mg
	FP-36774A	10 ml at 1.0 mg/mL in water



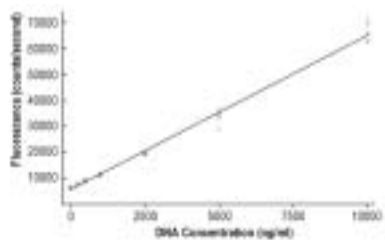
See also ready-to-use PI (AP4470) Fish Counterstain.

Cell Biology - Study/Probes

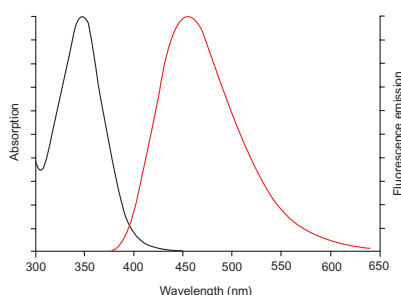
Nucleic acid Probes



Absorption and emission spectra of Hoechst 33258 bound to DNA.



* EthBr (page E121) achieves superior sensitivity in solution than hoechst 33258.



DAPI and Hoechst dyes

Hoechst are bisbenzimidates that bind to minor-grooves of DNA (multiple affinity types) with fluorescence enhancement. Fluorescence depends on pH (higher at pH5), and surfactants. Their use has been popularized thanks to their relatively non toxicity, ability to be excited by most common light sources (i.e. argon-ion laser), and suitability for multicolour imaging (large Stokes shift).

DAPI are also minor-groove binder blue dyes, but with AT cluster selectivity, higher photostability.

abs em. Hoechst 33258

$C_{25}H_{37}Cl_3N_6O_6$ MW : 624 (hydrated)

Soluble in water

Store at 4°C

$\lambda_{exc.}/\lambda_{em.}$: 352/461nm ; EC : 40 000 $M^{-1}cm^{-1}$

◆ A popular nuclear counterstain

Applications : apoptosis and cell cycle studies, flow-cytometry...

◆ Used to detect DNA at 250 ng-20 µg/ml in solution*

◆ Also used to stain chromosomes in fluorescence microscopy.

Description	Cat.#	Qty
Hoechst 33258	FP-61248A	100 mg
Hoechst 33258, 20 mM in water	FP-BB1330	5 ml
Hoechst 33258, 10 mg/ml in water	FP-41387A	10 ml

abs em. Hoechst 33342

$C_{27}H_{37}Cl_3N_6O_4$ MW : 615.99 (hydrated)

Soluble in water

Store at 4°C

$\lambda_{exc.}/\lambda_{em.}$: 350/461 nm ; EC : 45 000 $M^{-1}cm^{-1}$

Its uses are similar to Hoechst 33258 (FP-BB1330), but it is slightly more cell-permeant.

Description	Cat.#	Qty
Hoechst 33342	FP-71131A	100 mg
Hoechst 33342, 20 mM in water	FP-BB1340	5 ml
Hoechst 33342, 10 mM in water	FP-59046A	10 ml

abs em. Hoechst 34580

$C_{27}H_{32}Cl_3N_7$ MW : 560.96

Store at 4°C

$\lambda_{exc.}/\lambda_{em.}$ (bound) : 392/440 nm ; EC : 47 000 $M^{-1}cm^{-1}$

Description	Cat.#	Qty
Hoechst 34580	FP-R1286A	5 mg

abs em. Hoechst S769121

$C_{25}H_{34}Cl_3N_7O_5S$ MW : 651.02 (triHCl, triH₂O)

Store at 4°C

$\lambda_{exc.}/\lambda_{em.}$ (bound) : 355/495 nm ; EC : 36 000 $M^{-1}cm^{-1}$

Membrane impermeant nuclear counterstain

Description	Cat.#	Qty
Hoechst S769121	FP-M1477A	10 mg

abs em. DAPI

4',6-diamidino-2-phenylindole, dihydrochloride salt

$C_{16}H_{17}Cl_2N_5$ MW : 350.25

Soluble in water, DMF

Store at 4°C

$\lambda_{exc.}/\lambda_{em.}$ (no DNA, water) : 344/450 nm ; EC : 21 000 $M^{-1}cm^{-1}$

$\lambda_{exc.}/\lambda_{em.}$ (DNA-bound) : 358/461 nm (DNA).

DAPI is a popular blue fluorescent DNA probe. The dye binds to dsDNA (preferentially binds to AT clusters) with a ~20-fold fluorescence enhancement (dependant on detergents and ionic agents). May also bind to RNA (AU selective). It is excited with a mercury-arc lamp or with the UV lines of the argon-ion laser.

DAPI is an excellent nuclear and chromosome counterstain on slides, but it is also used for chromosome banding, and mycoplasma detection. DAPI can be used with sulforhodamine 101 in fixed apoptotic cells to reveal concomitant breakdown of proteins and DNA. Being semi-permeant, DAPI can be used in flow cytometry. DAPI provides a superior detection of dsDNA in agarose gels than Ethidium bromide (significantly more-sensitive, and more selective in presence of dsRNA), as well as Hoechst dyes (more photostable).

Reference : Biotechnic. Histochem. 70, 220(1995).

Description	Cat.#	Qty
DAPI	FP-371867	10 mg
	AP4460	50 tests
	AP4461	2 x 625 tests

abs em. DAPI dilactate

$C_{22}H_{27}N_5O_6$ MW : 457.49

Soluble in water/MeOH

$\lambda_{exc.}/\lambda_{em.}$ (hydrolyzed, DNA) : 358/461 nm

A water soluble derivate of DAPI, cell-impermeant. Higher concentrations are however necessary in living cells.

Description	Cat.#	Qty
DAPI dilactate	FP-66034A	10 mg

Other DNA probes

abs em. Acridine homodimer

bis-(6-chloro-2-methoxy-9-acridinyl)spermine

Soluble in DMSO, DMF

$\lambda_{exc.}/\lambda_{em.}$ (free) : 418/500 nm ; EC : 12 000 $M^{-1}cm^{-1}$

$\lambda_{exc.}/\lambda_{em.}$ (DNA) : 431/498 nm

Membrane impermeant. High-affinity on DNA binding (AT-selective).

Description	Cat.#	Qty
Acridine homodimer	FP-98990A	10 mg

abs em. Acridine Orange

$C_{17}H_{19}N_3.HCl.ZnCl_2$ MW : 438.1

Soluble in water, EtOH

Store at 4°C

$\lambda_{exc.}/\lambda_{em.}$ (DNA bound) : 501/526 nm

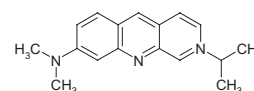
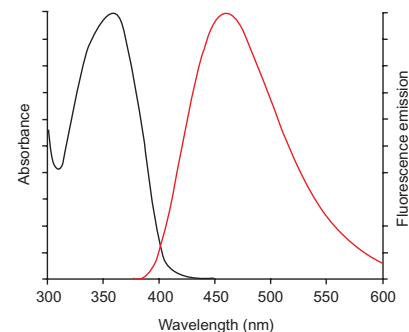
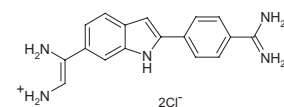
EC : 53 000 $M^{-1}cm^{-1}$

$\lambda_{em.}$ (RNA bound) : 460/650 nm

Membrane permeant DNA/RNA stain (interacts by both intercalation and electrostatic attractions). Acridine Orange is green when bound to DNA, not fluorescent in chromatin, and red when bound to RNA.

Applications : Cell-cycle studies by flow cytometry DNA conformational changes by dual-fluorescence RNA/DNA distinction.

Description	Cat.#	Qty
Acridine Orange	FP-05920D	50 g
	FP-21092A	10 ml at 10 mg/mL solution in water



See Nonyl Acridine orange FP-58566 page E134 for application to mitochondria study.
See application to phagosome-lysosome fusion study.

Cell Biology - Study/Probes

Nucleic acid Probes

abs em. ACMA

9-Amino-6-Chloro-2MethoxyAcridine

MW : 258.71

Soluble in DMSO

$\lambda_{exc.}/\lambda_{em.}$: 412/471nm

A DNA intercalator that binds selectively to AT sequences.

Description	Cat.#	Qty
ACMA	FP-155822	25mg

abs em. AAD (7-aminoactinomycin D)

$C_{62}H_{87}N_{13}O_{16}$ MW : 1270.5

Soluble in DMF, DMSO

Store at -20°C and protect from light

$\lambda_{exc.}/\lambda_{em.}$ (DNA) : 546/647 nm ; EC : 25 000 M⁻¹cm⁻¹

DNA intercalator with GC specificity. Weakly membrane permeant.

Applications : Chromosome banding (polytene chromosomes and chromatin), multicolour fluorescence microscopy (argon-ion laser), Flow cytometry.

Also available as non fluorescent form, Actinomycin D #FP-09086A (used in a similar way). The caused binding site distortion change the pattern of other dyes or enzymes interacting with DNA.

Description	Cat.#	Qty
AAD (7-aminoactinomycin D)	FP-132303	1 mg

abs em. LDS 751

$\lambda_{exc.}/\lambda_{em.}$ (DNA) : 543/712 nm

$\lambda_{exc.}/\lambda_{em.}$ (RNA) : 590/607 nm

Membrane permeant excited by the argon-ion laser at 488 nm. High Stockes shift allows multicolour imaging.

Applications : analysis of intact nucleated or distinct cell types in mixed populations. Cell cycle, Apoptosis.

Description	Cat.#	Qty
LDS 751	FP-97384A	10 mg

abs em. Hydroxystilbamidine methane sulfonate

$C_{18}H_{24}N_4O_7S_2$ MW : 472.54

Store at -20°C and protect from light

$\lambda_{exc.}/\lambda_{em.}$ (DNA) : 360 nm/~450 nm, ca 625 nm ; EC : 27 000 M⁻¹cm⁻¹

Exhibits AT-selective binding/II structure.

Complex fluorescent properties allow DNA/RNA distinction.

Also used as a neuronal tracer (initial use), (section E143).

Description	Cat.#	Qty
Hydroxystilbamidine methane sulfonate	FP-40766A	10 mg

Nonyl Acridine Orange

See section I.J.

Description	Cat.#	Qty
Nonyl Acridine Orange	FP-58566A	50 mg

Psoralen-PEO-biotin

$C_{33}H_{44}N_4SO_{10}$ MW : 688.8

Store at 4°C

Labels nucleic acids in one step. Psoralen intercalates between thymine and other pyrimidine containing bases. Labeling occurs by photolysis at 350 nm, 10-30 min. PEO spacer confers excellent water solubility. DNA/RNA modification does not interfere with hybridization.

Description	Cat.#	Qty
Psoralen-PEO-biotin	FP-L77845	10 mg

AMCH-biotin

$C_{12}H_{21}N_5O_4S$ MW : 331.4

Store at -20°C and protect from light

An aldehyde reactive biotin.

Application : detection of abasic sites of DNA (AP sites, depurinated/depyrimidated sites). Less than one abasic site in 10^4 nucleotides can be detected.

Description	Cat.#	Qty
AMCH-biotin	FP-R07565	10 mg

Related products :

- ◆ Chromogenic counterstain (Hematoxylin, Methyl green pyronin)
- ◆ Fluorescent labels (CFSE, FAM-SE...)

Thiazole Orange

MW : 476.61

Methylene Blue

$C_{16}H_{24}ClN_3O_3S$; MW : 373.90

Soluble in DMSO

λ_{exc} : 661nm

General stain ; A supravital stain fo nerves and nerve terminals.

Description	Cat.#	Qty
Methylene Blue	022848	100 g
	022849	500 g

Related products :
Chromogenic counterstain (Hematoxylin, Methyl green pyronin).
Fluorescent labels (CFSE, FAM-SE...).

Biochemicals for Nuclear Receptors

Description	Cat.#	Qty
* Nuclear receptors		
BADGE	S03610	25 g
Carbaprostacyclin	300370	1 mg
Ciglitazone	Q87580	1 mg
8(S)-HETE	127350	25 µg
(±)-Ibuprofen	Q87360	500 mg
Indomethacin	27155A	1 g
Leukotriene B4	419051	25 µg
MCC-555	J74220	1 mg
Meclofenamate (sodium salt)	Q87420	1 g
MEDICA 16	Q88320	1 mg
Phenethyl Caffeiato	Q87560	10 mg
PPAR.alpha. Blocking Peptide	S00450	1 ea
PPAR.gamma. Blocking Peptide	Q88990	1 ea
Prostaglandin A1	244102	1 mg
Prostaglandin A2	401172	1 mg
Prostaglandin D1	Q84960	1 mg
Prostaglandin D2	366032	1 mg
Prostaglandin I2 (sodium salt)	401162	1 mg
Prostaglandin J2	300400	500 µg
15-deoxy-.delta.12,14-Prostaglandin J2	861300	1 mg
TO-901317	S03620	5 mg
Trichostatin A	Q88120	500 µg
Wy 14643	789395	5 mg

Related products

FRET is used for many nucleic acid detections. DNA probes with specific hybridization properties are prepared including quenched dyes (linear quenched probes or molecular beacons). To create your own nucleic acid probes for conventional FRET (donor) dyes and FRET (acceptor) quenchers for superior proprietary ones, the series of FluoQuench™ and BHQ FRET detectors, or as custom services.

See also DNA assays, i.e. for DNA damage quantitation page E180.