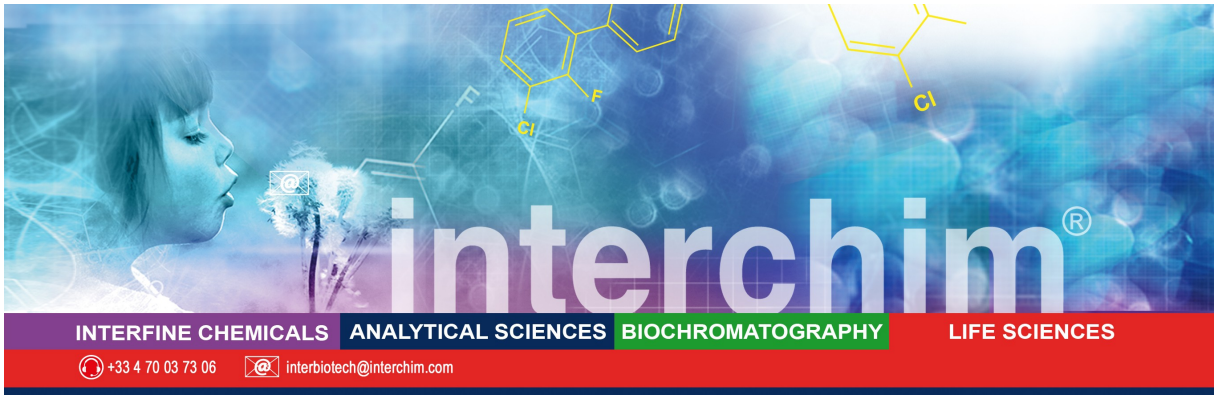
FT-12302A

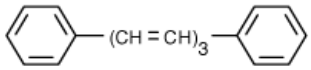


DPH

Product Information

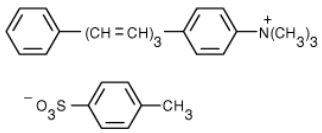
Diphenylhexatriene (DPH) and its derivatives are amphiphilic probes for membrane studies.

Name :	**DPH**
	1,6-Diphenyl-1,3,5-hexatriene
Catalog Number :	FP-12302A, 250mg
Structure :	$C_{18}H_{16}$ - CAS: [1720-32-7]
Molecular Weight :	MW= 232.32
Solubility:	DMF, MeCN
Absorption / Emission :	$\lambda_{exc}\backslash\lambda_{em}$ (MetOH) = 350/452nm
EC (M^{-1} cm^{-1}) **:**	88 000



Storage: Room temperature (R)
Protect from light

Name :	**TMA-DPH**
	1-(4-trimethylammoniumphenyl)-6-phenyl-1,3,5-hexatriene p-toluenesulfonate
Catalog Number :	FP=35147B, 25mg
Structure :	$C_{28}H_{31}NO_3S$ – CAS: [15534-33-3]
Molecular Weight :	MW= 461.63
Solubility:	DMF, DMSO
Absorption / Emission :	$\lambda_{exc}\backslash\lambda_{em}$ (methOH) = 356/451nm
EC (M^{-1} cm^{-1}) **:**	74 100



Storage: Room temperature (R)
Protect from light and moisture (keep dessicate)

Scientific information

1,6-Diphenyl-1,3,5-hexatriene (**DPH**) and its derivatives are essentially nonfluorescent in water. Absorption and emission spectra have multiple peaks. The wavelength, resolution and relative intensity of these peaks are environment dependent. They are cylindrically shaped molecules with absorption and fluorescence emission transition dipoles aligned approximately parallel to their long molecular axis. Consequently, their fluorescence polarization is high in the absence of rotational motion and is very sensitive to reorientation of the long axis resulting from interactions with surrounding lipids. These properties have led to their extensive use for membrane fluidity measurements, and are largely sensitive to only the angular reorientation of lipid acyl chains

DPH used to be a popular fluorescent probe of membrane interiors. The orientation of DPH is assumed to be oriented parallel to the lipid acyl chain axis, but is loosely constrained within lipid bilayers, and also reside in the center of the lipid bilayer parallel to the surface, as demonstrated by time-resolved fluorescence anisotropy and polarized fluorescence measurements of oriented samples. DPH shows no partition preference between

coexisting gel- and fluid-phase phospholipids. Intercalation of DPH and its derivatives into membranes is accompanied by strong enhancement of their fluorescence; their fluorescence is practically negligible in water. The fluorescence decay of DPH in lipid bilayers is complex. Fluorescence decay data are often analyzed in terms of continuous lifetime distributions, which are in turn interpreted as being indicative of lipid environment heterogeneity.

To improve the localization of DPH in the membrane, and for other applications, several other derivatives were proposed, as cationic forms TMA-DPH (FP35147) and TMAP-DPH (FP-M1282A), and the anionic form DPH Propionic acid (FP-47019A).

Cationic DPH derivatives

In **TMA-DPH**, a cationic trimethylammonium substituent acts as a surface anchor.
Like DPH, TMA-DPH (FP-35147) derivatives readily partition from aqueous dispersions into membranes and other lipid assemblies, accompanied by strong fluorescence enhancement. The lipid–water partition coefficients (Kp) for TMA-DPH and TMAP-DPH (Kp = 2.4 10^5 and 2.9 10^5, respectively) are lower than for DPH (Kp = 1.3 10^6), reflecting the increased water solubility caused by their polar substituents. The fluorescence decay lifetime of TMA-DPH is more sensitive to changes in lipid composition and temperature than is the fluorescence decay lifetime of DPH.

Staining of cell membranes by TMA-DPH is much more rapid than staining by DPH. However, the duration of plasma membrane surface staining by TMA-DPH before internalization into the cytoplasm is quite prolonged. As a consequence, TMA-DPH introduced into Madin–Darby canine kidney (MDCK) cell plasma membranes does not diffuse through tight junctions and remains in the apical domain, whereas the anionic DPH propionic acid accumulates rapidly in intracellular membranes. TMA-DPH residing in the plasma membrane can be extracted by washing with medium, thus providing a method for isolating internalized probe and monitoring endocytosis. Furthermore, TMA-DPH is sensitive to increases in plasma membrane surface area resulting from exocytosis.

TMA-DPH fluorescence polarization measurements can be combined with video microscopy to provide spatially resolved images of phospholipid order in large liposomes and single cells. Information regarding lipid order heterogeneity among cell populations can be obtained in a similar way using flow cytometry.

DPH Propionic Acid

DPH propionic acid (FP-47019A) has principally been used as a synthetic intermediate for preparation of phospholipids and other molecules. When used as a membrane probe, its location within the lipid bilayer interior is dependent on the ionization state of its carboxylate group. DPH propionic acid has been used together with DPH as a probe for lipid–protein interactions and ethanol-induced perturbations of membrane structure.

References

References - TMA-DPH FP=35147

Abstract · "Cholesterol modulates ligand binding and G-protein coupling to serotonin(1A) receptors from bovine hippocampus." Pucadyil TJ, Chattopadhyay A. Biochim Biophys Acta 1663, 188-200 (2004)
Abstract · "Evaluation of hydralazine and procainamide effects on fibroblast membrane fluidity." Weglarz L, Koceva-Chyla A, Gwozdzinski K, Dzierzewicz Z, Jozwiak Z. Biochimie 85, 549-56 (2003)
Abstract · "Susceptibilities of phospholipid vesicles containing different sterols to amphotericin B-loaded lysophosphatidylcholine micelles." Onda M, Inoue Y, Kawabata M, Mita T. J Biochem (Tokyo) 134, 121-8 (2003)
Abstract· Article · "A mechanism for stabilization of membranes at low temperatures by an antifreeze protein." Tomczak MM, Hincha DK, Estrada SD, Wolkers WF, Crowe LM, Feeney RE, Tablin F, Crowe JH. Biophys J 82, 874-881 (2002) PN46146.
Abstract · "Thioridazine interacts with the membrane of mitochondria acquiring antioxidant activity toward apoptosis -- potentially implicated mechanisms." Rodrigues T, Santos AC, Pigoso AA, Mingatto FE, Uyemura SA, Curti C. Br J Pharmacol 136, 136-142 (2002)
Abstract · "Fluorescent lipid probes: some properties and applications (a review)." Maier O, Oberle V, Hoekstra D. Chem Phys Lipids 116, 3-18 (2002) PN47257.

References - DPH FP-12302A

Abstract· Article · "Influence of DPH on the structure and dynamics of a DPPC bilayer." Repakova J, Holopainen JM, Morrow MR, McDonald MC, Capkova P, Vattulainen I. Biophys J 88, 3398-410 (2005) PN57136.
Abstract · "Fluorescence study on rat epithelial cells and liposomes exposed to aromatic nitroxides." Gabbianelli R, Falcioni G, Lupidi G, Greci L, Damiani E. Comp Biochem Physiol C Toxicol Pharmacol 137, 355-62 (2004) PN53332.

FT-12302A

Abstract · Article · "Dipole potential and head-group spacing are determinants for the membrane partitioning of pregnanolone." Alakoskela JM, Soderlund T, Holopainen JM, Kinnunen PK. Mol Pharmacol 66, 161-8 (2004) PN56820.
Abstract · "pH, serum proteins and ionic strength influence the uptake of merocyanine 540 by WiDr cells and its interaction with membrane structures." Cunderlikova B, Sikurova L, Moan J. Bioelectrochemistry 59, 1-10 (2003) PN50864.
Abstract · Article · "Surface charge density determines the efficiency of cationic gemini surfactant based lipofection." Ryhanen SJ, Saily MJ, Paukku T, Borocci S, Mancini G, Holopainen JM, Kinnunen PK. Biophys J 84, 578-87 (2003) PN53526.
Abstract · "The macrolide antibiotic azithromycin interacts with lipids and affects membrane organization and fluidity: studies on Langmuir-Blodgett monolayers, liposomes and J774 macrophages." Tyteca D, Schanck A, Dufrene YF, Deleu M, Courtoy PJ, Tulkens PM, Mingeot-Leclercq MP. J Membr Biol 192, 203-15 (2003) PN53519.

Ordering information

Catalog size quantities and prices may be found at http://www.fluoprobes.com
Please inquire for higher quantities (availability, shipment conditions).

For any information, please ask : FluoProbes® / Interchim; Hotline : +33(0)4 70 03 73 06

Rev.D0518E