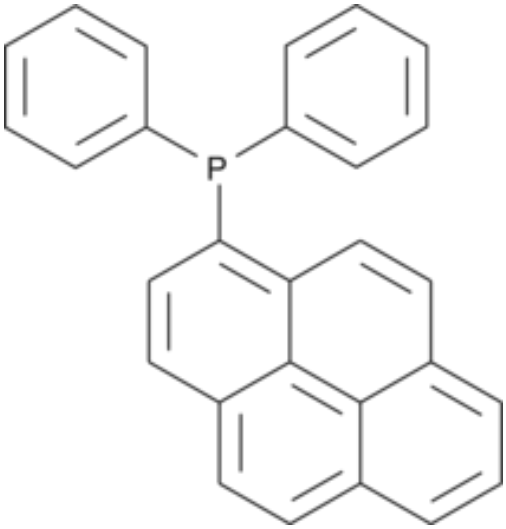
Product Data Sheet

Product Name: DPPP (Diphenyl-1-pyrenylphosphine)
Cat. No.: GC43569

Chemical Properties

Cas. No.	110231-30-6		
SMILES	c1ccc(cc1)P(c1ccccc1)c1ccc2ccc3cccc4ccc1c2c34		
Formula	$C_{28}H_{19}P$	M.Wt	386.4
Solubility	DMF: 10 mg/ml,Methylene Chloride: 1 mg/ml	Storage	Store at -20°C,protect from light
General tips	For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20°C for several months.		
Shipping Condition	Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.		

Structure



Protocol

DPPP Method for Determining Lipid Peroxidation Levels in Live Cells [1]

This protocol is adapted from research data and provided for reference only. Adjustments may be necessary based on specific experimental requirements.

Caution: Product has not been fully validated for medical applications. For research use only.
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1. Reagent Preparation: Dissolve DPPP (Diphenyl-1-pyrenylphosphine) in DMSO to prepare a stock solution. Store at -20°C under dark conditions with nitrogen protection. Dilute with PBS to the working concentration (e.g., 167μM) before use. Prepare complete cell culture medium (containing 10% fetal bovine serum, 50μg/ml penicillin, and 50μg/ml streptomycin).

2. Cell Culture and DPPP Labeling: Culture the target cells routinely at 37°C with 5% CO_2. For the experiment, collect the cells and wash three times with PBS. Resuspend in PBS (density approximately 1×10^8 cells/ml) and pre-incubate at 37°C for 5 minutes. Add the DPPP working solution (final concentration 167μM) and incubate at 37°C in the dark for 5 minutes. After incubation, wash the cells three times with PBS to remove unincorporated DPPP. Finally, resuspend in an appropriate buffer or culture medium for subsequent use. All operations must be performed in light-shielded containers.

3. Lipid Peroxidation Induction and Treatment: Suspend the DPPP-labeled cells (density approximately 3×10^6 cells/ml) in growth medium. Add the required inducer (e.g., DEM, AAPH, etc.) or replace with medium containing different serum concentrations (e.g., serum-free medium). Incubate at 37°C in a CO_2 incubator in the dark for the specified duration. A vitamin E (α-tocopherol) treatment group can be set up as an antioxidant control.

4. Fluorescence Detection: Use a fluorescence spectrophotometer set to an excitation wavelength of 351nm and an emission wavelength of 380nm to measure the sample fluorescence intensity. Alternatively, use a fluorescence microscope to directly observe the fluorescence distribution of DPPP oxide in the cells (staining in the cytoplasmic membrane region, no staining in the nucleus).

Precautions:

(1) DPPP has no significant effect on cell proliferation, viability, or morphology and can be used for long-term peroxidation experiments for at least 3 days.

(2) DPPP oxide is very stable within the membranes of live cells, with no significant change in fluorescence signal for at least 2 days.

(3) For your safety and health, please wear a lab coat and disposable gloves during operation.

References:

[1] Takahashi M, Shibata M, Niki E. Estimation of lipid peroxidation of live cells using a fluorescent probe, diphenyl-1-pyrenylphosphine. Free Radic Biol Med. 2001 Jul 15;31(2):164-74.

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Background

DPPP (Diphenyl-1-pyrenylphosphine) is a non-fluorescent lipophilic fluorescent probe. DPPP can undergo a stoichiometric reaction with lipid hydroperoxides to produce highly fluorescent DPPP-O (excitation/emission wavelengths = 351/380nm). DPPP can be used in related research such as lipid peroxidation detection, monitoring of cellular oxidative levels, and determination of hydroperoxide content in foods[1-4].

References:

[1] Xing C, Liu J, Chen F, et al. Diphenyl-1-pyrenylphosphine: photo-triggered AIE/ACQ transition with remarkable third-order nonlinear optical signal change. Chem Commun (Camb). 2020 Apr 14;56(30):4220-4223.
[2] Santas J, Guardiola F, Rafecas M, et al. Determination of total plasma hydroperoxides using a diphenyl-1-pyrenylphosphine fluorescent probe. Anal Biochem. 2013 Mar 1;434(1):172-7.
[3] Morita M, Naito Y, Yoshikawa T, et al. Rapid assessment of singlet oxygen-induced plasma lipid oxidation and its inhibition by antioxidants with diphenyl-1-pyrenylphosphine (DPPP). Anal Bioanal Chem. 2016 Jan;408(1):265-70.
[4] Santas J, Guzmán YJ, Guardiola F, et al. High-throughput analysis of lipid hydroperoxides in edible oils and fats using the fluorescent reagent diphenyl-1-pyrenylphosphine. Food Chem. 2014 Nov 1;162:235-41.

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