

Product Data Sheet

Product Name: IPPD-Q
Cat. No.: GC91672

Chemical Properties

Cas. No. 68054-73-9

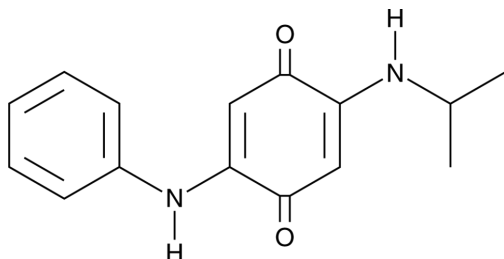
Formula $C_{15}H_{16}N_2O_2$ M.Wt 256.3

Solubility Acetonitrile: Slightly soluble: 0.1-1 mg/ml, DMSO: Sparingly soluble: 1-10 mg/ml
Storage -20°C

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 sizes: ship with RT, or blue ice upon request.

Structure



Protocol

Cell experiment [1]:

Cell lines hCMEC-D3 cell

Caution: Product has not been fully validated for medical applications. For research use only.

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Preparation Method hCMEC-D3 cells were grown in endothelial cell medium (ECM) which included 5% fetal bovine serum (FBS) and 1% endothelial cell growth supplement along with 1% penicillin/streptomycin solution. Under 37 °C conditions with 5% CO₂ humidified atmosphere the cell culture medium was changed every two days until cells reached 90% confluency. For 24 hours cells underwent treatment with different concentrations of IPPD-Q including 0, 0.01, 0.10, and 1.00μM. Collect cells from various exposure groups for protein expression analysis using Western blotting assays. Assess whether atorvastatin at a concentration of 0.30μM could modify the cellular effects of IPPD-Q when cells received both treatments simultaneously. The vehicle control that consisted of 0.1% DMSO (v/v) showed negligible effects after its evaluation process and thus became the designated exposure group 0.

Reaction Conditions 0, 0.01, 0.10, and 1.00μM; 24h

Applications IPPD-Q can increase the level of TNF-α, induce cell apoptosis, up-regulate PAI-1 and lead to endothelial-to-mesenchymal transition of hCMEC-D3 cells, resulting in endothelial cell dysfunction.

References:

[1] Han M, Xia K, Xue Y, et al. Emergence of More Potent PPD-Qs beyond 6PPD-Q in Human Blood and Cerebrospinal Fluid[J]. Environmental Science & Technology Letters, 2025.

Background

IPPD-Q is the oxidation products of N,N'-Substituted p-phenylenediamines (PPD), with oxidative potential values of 0.93μM min⁻¹μM⁻¹ for dithiothreitol (DTT) consumption rate^[1-2]. IPPD-Q has been used in air pollution research and pollutant diagnosis research^[3].

In vitro, IPPD-Q exhibits EC₅₀ values of 2.97mg/L (30min) for Aquatic bacterium *Vibrio fischeri* ^[4].

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IPPD-Q treatment (2.97mg/L) for 30min resulted in a significant decrease in metabolic activity and esterase activity and an increase in the degree of membranocyte damage and oxidative stress in *Vibrio fischeri*^[4]. Treatment of hCMEC-D3 cells with 1.00μM IPPD-Q for 24 hours induced cell apoptosis, endothelial-mesenchymal transition, upregulated Plasminogen activator inhibitor-1 (PAI-1) expression, and triggered blood-brain barrier dysfunction^[5].

References:

- [1] Wang W, Cao G, Zhang J, et al. p-Phenylenediamine-derived quinones as new contributors to the oxidative potential of fine particulate matter[J]. Environmental Science & Technology Letters, 2022, 9(9): 712-717.
- [2] Wang W, Cao G, Zhang J, et al. Beyond substituted p-Phenylenediamine antioxidants: Prevalence of their quinone derivatives in PM_{2.5}[J]. Environmental Science & Technology, 2022, 56(15): 10629-10637.
- [3] Mao T, Liu W, Deng J, et al. p-Phenylenediamines and p-phenylenediamine quinone derivatives in rubber consumer products and typical urban dust: Sources, transformation profiles, and health risks[J]. Environment International, 2024, 192: 109042.
- [4] Wang W, Chen Y, Fang J, et al. Toxicity of substituted p-phenylenediamine antioxidants and their derived novel quinones on aquatic bacterium: Acute effects and mechanistic insights[J]. Journal of Hazardous Materials, 2024, 469: 133900.
- [5] Han M, Xia K, Xue Y, et al. Emergence of More Potent PPD-Qs beyond 6PPD-Q in Human Blood and Cerebrospinal Fluid[J]. Environmental Science & Technology Letters, 2025.

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