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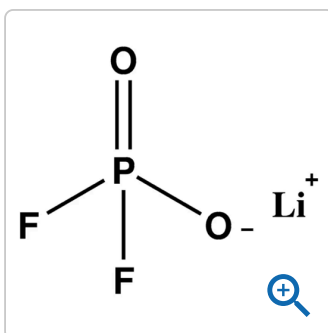
933708 ▶ **Sigma-Aldrich**

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Lithium difluorophosphate

≥99% trace metals basis, acid ≤ 200 ppm, battery grade

Synonym(s): LiDFP, LiF₂PO₂, Lithium difluorophosphate, Lithium phosphorodifluoride



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933708-25G

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About This Item

Empirical Formula (Hill Notation):

LiPO_2F_2

CAS Number:

[24389-25-1](#)

Molecular Weight:

107.91

NACRES:

NA.21

MDL number:

[MFCD25976784](#)

Key Documents

[COA](#)

[COO](#)

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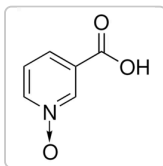
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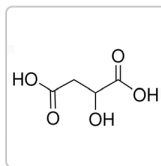
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Recommended Products



Sigma-Aldrich
106194
Nicotinic acid *N*-oxide



Supelco
PHR1273
Malic acid

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Properties

grade	battery grade
Quality Level	100
description	acid $\leq$ 200 ppm
assay	$\geq$ 99% trace metals basis
form	powder
greener alternative product characteristics	Design for Energy Efficiency Learn more about the Principles of Green Chemistry .
sustainability	Greener Alternative Product
impurities	$\leq$ 200 ppm acid
cation traces	Ca: $\leq$ 5 ppm, Cr: $\leq$ 10 ppm, Fe: $\leq$ 5 ppm, K: $\leq$ 5 ppm, Na: $\leq$ 5 ppm, Pb: $\leq$ 5 ppm
application(s)	battery manufacturing
greener alternative category	Enabling

Description

General description

Lithium difluorophosphate (LiDFP) is a high-performance additive for lithium-ion batteries. LiDFP is a white powder that is soluble in acetone and dimethoxyethane and slightly soluble (0.4g/100g solvent) in both diethyl carbonate and 1:1 v/v mixtures of dimethylcarbonate and propylene carbonate. Our LiDFP is designed with high-purity and low trace impurities of moisture and acid.

Lithium Difluorophosphate is an effective electrolyte additive that enhances the stability and safety of lithium-ion batteries. By promoting the formation of a robust solid electrolyte interphase (SEI), it improves battery lifespan and performance, supporting greener technologies through more efficient, durable, and environmentally friendly energy storage solutions. [Click here](#) for more information.

Application

Lithium difluorophosphate is a multi-functional additive for high voltage lithium-ion batteries and is often added to lithium hexafluorophosphate (LiPF₆)-based electrolytes in carbonate solvents. For example, a recent study showed that a 1 wt% addition of LiDFP to the LiPF₆-carbonate electrolyte in a NMC-graphite cell significantly increased capacity retention (97%) after 200 cycles, compared to the same cells without the additive (only 77% capacity retention.)[1] LiDFP has been shown to perform well with nickel-rich cathode materials[2] because it generates a more uniform, extremely stable, and lower resistance solid-electrolyte interphase (SEI) on the cathode surface. This passivation film not only suppresses the subsequent decomposition of the electrolyte, but also prevents the dissolution of transition metal ions from NMC particles, resulting in improved cyclic stability and discharge capacity. In addition, research suggests that LiDPF additive also helps to form a stable and ionically conductive SEI passivation film on lithium metal anodes.[3] Our LiDFP, with high-purity and low moisture and acid impurities, is suitable for research on increasing the energy density and longer cycling performance in lithium-ion batteries and lithium-metal batteries.

Safety Information

pictograms



signalword

Danger

hcodes

H301,H312,H314,H372,H411

pcodes

P260 - P273 - P280 - P303 + P361 + P353 - P304 + P340 +

GHS06,GHS08,GHS05,GHS09

P310 - P305 + P351 + P338

Hazard Classifications

Acute Tox. 3 Oral -
Acute Tox. 4 Dermal -
- Aquatic Chronic 2 -
Eye Dam. 1 - Skin
Corr. 1B - STOT RE 1

Storage Class

6.1B - Non-combustible acute
toxic Cat. 1 and 2 /
very toxic
hazardous
materials

wgk
WGK 3

flash_point_f
Not applicable

flash_point_c
Not applicable

Documentation

[Certificate Of Analysis](#)

[Certificate Of Origin](#)



SDS



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[MKCX4403](#)

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Peer Reviewed Papers

Lithium Difluorophosphate-Based Dual-Salt Low Concentration Electrolytes for Lithium Metal Batteries

Zheng, H., et al.

Advanced Energy Materials, 10, 2001440- 2001440 (2020)

?Additive engineering for robust interphases to stabilize high-Ni layered structures at ultra-high voltage of 4.8?V

Tan, S., Shadike, Z., Li, J.?et al.

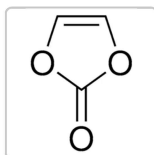
Nature Energy, 7, 484?494-484?494 (2022)

Lithium difluorophosphate as a multi-functional electrolyte additive for 4.4V LiNi0.5Co0.2Mn0.3O2/graphite lithium ion batteries

Lei, Qiufen, et al.

Journal of Electroanalytical Chemistry, 846, 113141-113141 (2019)

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Sigma-Aldrich

809977

Vinylene carbonate



Sigma-Aldrich

920371

Lithium
hexafluorophosphate

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Related Product

757136[Lithium bis\(oxalato\)borate](#)

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Global Trade Item Number

SKU	GTIN
933708-25G	04065269263166

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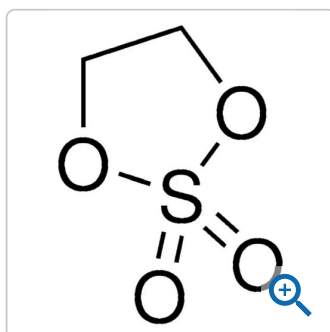
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Ethylene sulfate

≥99%, anhydrous, battery grade

Promotion Available

Synonym(s): 1,3,2-Dioxathiolane 2,2-dioxide, DTD



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Estimated to ship on June 29, 2026 [Details](#)



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About This Item

Empirical Formula (Hill Notation):	C ₂ H ₄ O ₄ S
CAS Number:	1072-53-3
Molecular Weight:	124.12
UNSPSC Code:	12352005
MDL number:	MFCD00221769
NACRES:	MA.24

Key Documents

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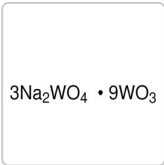
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Recommended Products



Z768340
Labeling tape

[Quick View](#)



Supelco
80656
Sodium polytungstate
solution

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Properties

Quality Level	100
grade	anhydrous, battery grade
assay	≥99%
form	powder
greener alternative product characteristics	Design for Energy Efficiency Learn more about the Principles of Green Chemistry .
sustainability	Greener Alternative Product
impurities	≤750 ppm (H ₂ O)
bp	231 °C
mp	95-97 °C (lit.)
application(s)	battery manufacturing

greener alternative category	Enabling
storage temp.	2-8°C
SMILES string	<chem>O=S1(=O)OCCO1</chem>
InChI	1S/C2H4O4S/c3-7(4)5-1-2-6-7/h1-2H2
InChI key	ZPFAVCIQZKRBGF-UHFFFAOYSA-N

Description

General description

Ethylene sulfate (DTD) is a polar cyclic sulfate ester. It is a white powder that is soluble in many of the polar organic solvents used in battery applications, including carbonates. Our battery grade ethylene sulfate is differentiated by its high purity, low trace water content, and low trace acid content, which avoid unwanted chemical reactions with the anode and increase capacity, safety, and life span in batteries

Application

Ethylene sulfate has a range of industrial applications. Our anhydrous battery grade ethylene sulfate is primarily used as an electrolyte additive to extend the lifetime of lithium-ion batteries and sodium-ion batteries.[,] Ethylene sulfate helps to improve the formation of a stable solid-electrolyte interphase (SEI) on the surface of the anode material, which can prevent reaction between the anode and the electrolyte, leading to better battery lifespan and more stable impedance across the interphase.[,] DTD is often used in conjunction with other additives. One of the best-performing electrolyte formulations for graphite cells is a 1.0 M LiPF6 in a carbonate blend with 1% DTD and 2%VC.[,]

Safety Information

pictograms



signalword

Danger

hcodes

H302,H314,H317,H351

pcodes

P260 - P280 - P301 + P312 - P303 + P361 + P353 - P304

GHS08,GHS05,GHS07

+ P340 + P310 - P305 + P351 + P338

Hazard Classifications

Acute Tox. 4 Oral -
Carc. 2 - Eye Dam. 1
- Skin Corr. 1B - Skin
Sens. 1B

Storage Class

8A - Combustible
corrosive
hazardous
materials

wgk

WGK 3

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Not applicable

flash_point_c

Not applicable

Documentation

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Protocols and Articles

Articles

[Role of Advanced Electrolytes in Sodium Ion Batteries](#)

Discover the role of electrolytes in sodium-ion batteries, to enhance performance, safety, and sustainability in energy storage solutions.

Peer Reviewed Papers

Effect of Sulfate Electrolyte Additives on LiNi_{1/3}Mn_{1/3}Co_{1/3}O₂/Graphite Pouch Cell Lifetime: Correlation between XPS Surface Studies and Electrochemical Test Results

Madec L, et al.

The Journal of Physical Chemistry C, 118, 29608-29622 (2014)

Comparative study of 1,3-propane sultone, prop-1-ene-1,3-sultone and ethylene sulfate as film-forming additives for sodium ion batteries

Zhang Q, et al.

Journal of Power Sources, 541, 231726-231726 (2022)

Ethylene sulfate as film formation additive to improve the compatibility of graphite electrode for lithium-ion battery

Xuecheng L, et al.

Ionics, 20, 795-801 (2014)

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128252
Ethylene sulfide

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Comparable Product

4716901,3,2-Dioxathiolane 2,2-dioxide98%

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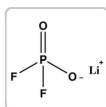
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