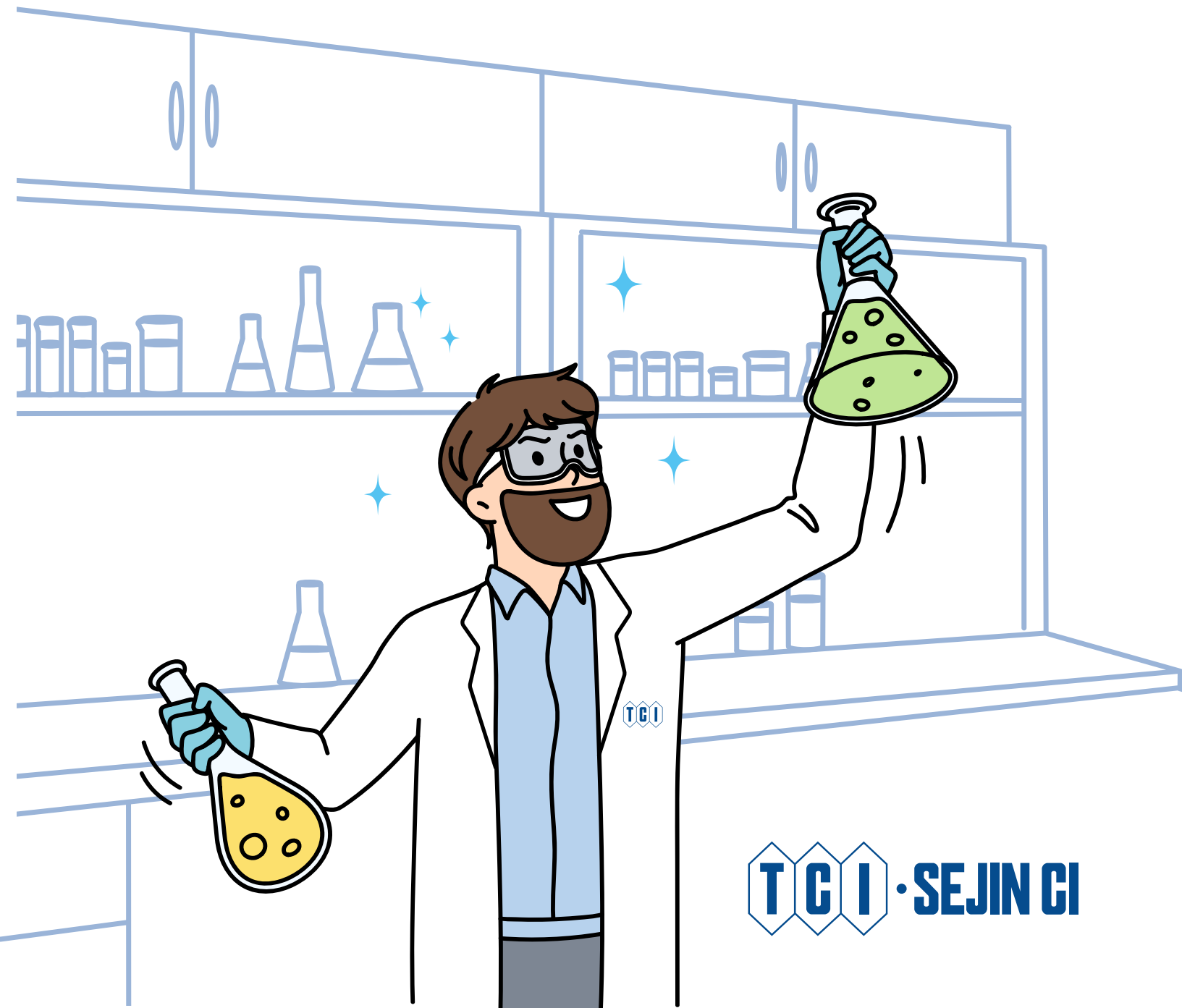




MATERIALS

TCI's **Battery Materials** **Guide Book**



TCI · SEJIN CI

Battery Research Reagents

Secondary batteries are rechargeable. There are small types of secondary batteries obtained from nickel-cadmium, nickel-hydrogen, and lithium ion sources. It is known that lead-acid batteries are relatively large. Secondary batteries are useful for automobiles, airplanes, agricultural equipment, electric vehicles, computers, mobile phones and so on. Among them, the lithium ion batteries are mainly used for various applications, and are manufactured by lithium cobalt oxide (anode), graphite (cathode), and a liquid electrolyte with organic components.¹⁾ The lithium ion batteries provide high voltage and energy density, because the lithium ion supplied from the lithium cobalt oxide is a carrier performing the charge/discharge of the battery. A memory effect hardly occurs. A package of the lithium ion batteries can be compact. Further development of a better secondary battery is also in progress towards a low-carbon society as well as energy security.

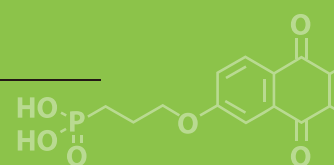
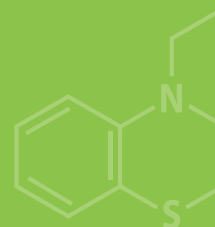
In order to improve security of the lithium ion batteries, it is expected to use an ionic liquid electrolyte,²⁾ phosphate-based organic solvent,³⁾ an organic and inorganic solid electrolyte, since an organic electrolyte solution is more or less flammable. An electrolyte solution requires a fluorine-containing flame retardant as an additive.⁴⁾ A selection of electrolyte is important for input-output characteristics, lifetime, security and voltage of a secondary battery. It is also expected that the electrolyte shows high lithium ion conductivity, both electrical and chemical stability, and a low environmental load.

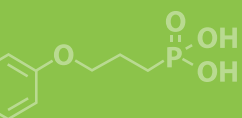
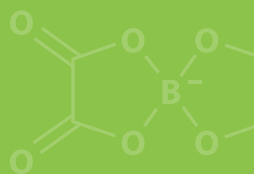
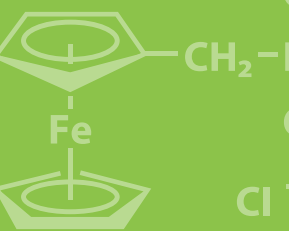
A next generation secondary battery with high energy density must be developed well. Among them, we may expect practical use of a secondary battery based on a multivalent ion carrier that can transport multi-electrons. A magnesium-based secondary battery has a theoretically high energy density. Furthermore, it is expected that one can use abundant magnesium for the battery and it is secure to use.⁵⁾

Redox flow battery (RFB) is developed for application of scalable stationary batteries, and one can expect that they are promising energy storage system for a smart grid that balance power supply and demand. Organic RFB which is fabricated by organic-based redox active electrolytes, has received good attention as they are potentially much less expensive than their vanadium-based flow batteries.⁶⁻⁸⁾

References

- 1) Revie : M. V. Reddy, G. V. Subba Rao, B. V. R. Chowdari, *Chem. Rev.* **2013**, 113, 5364.
- 2) M. Montanino, M. Moreno, M. Carewska, G. Maresca, E. Simonetti, R. Lo Presti, F. Alessandrini, G. B. Appetecchi, *J. Power Sources* **2014**, 269, 608.
- 3) H. Jia, J. Wang, F. Lin, C. W. Monroe, J. Yang, Y. NuLi, *Chem. Commun.* **2014**, 50, 7011.
- 4) Z. Zeng, X. Jiang, B. Wu, L. Xiao, X. Ai, H. Yang, Y. Cao, *Electrochim. Acta* **2014**, 129, 300.
- 5) Y. Orikasa, T. Masese, Y. Koyama, T. Mori, M. Hattori, K. Yamamoto, T. Okado, Z.-D. Huang, T. Minato, C. Tassel, J. Kim, Y. Kobayashi, T. Abe, H. Kageyama, Y. Uchimoto, *Sci. Rep.* **2014**, 4, 5622.
- 6) D. G. Kwabi, K. Lin, Y. Ji, E. F. Kerr, M.-A. Goulet, D. De Porcellinis, D. P. Tabor, D. A. Pollack, A. Aspuru-Guzik, R. G. Gordon, M. J. Aziz, *Joule* **2018**, 2, 1894.
- 7) J. D. Milshtein, A. P. Kaur, M. D. Casselman, J. A. Kowalski, S. Modekrutti, P. L. Zhang, N. H. Attanayake, C. F. Elliott, S. R. Parkin, C. Risko, F. R. Brushett, S. A. Odom, *Energy Environ. Sci.* **2016**, 9, 3531.
- 8) J. Winsberg, T. Hagemann, T. Janoschka, M. D. Hager, U. S. Schubert, *Angew. Chem. Int. Ed.* **2017**, 56, 686.





✓ Battery Additives

- Battery Cathode Active Materials
 - Nitriles
- Phosphate Esters
- Phosphazenes

✓ Battery Electrolytes

- Lithium Electrolytes
- Metal Electrolytes (Other)

✓ Electrode Materials

✓ Ionic Liquids

- Ammonium Salts
- Imidazolium Salts
- Morpholinium Salts
- Phosphonium Salts
- Piperidinium Salts
- Pyridinium Salts
- Pyrrolidinium Salts
- Sulfonium Salts

✓ Organic Redox Flow Battery Materials

- Organic Active Materials (Others)
 - Organic Radicals
- Quinones and Analogues

✓ Organic Solvents

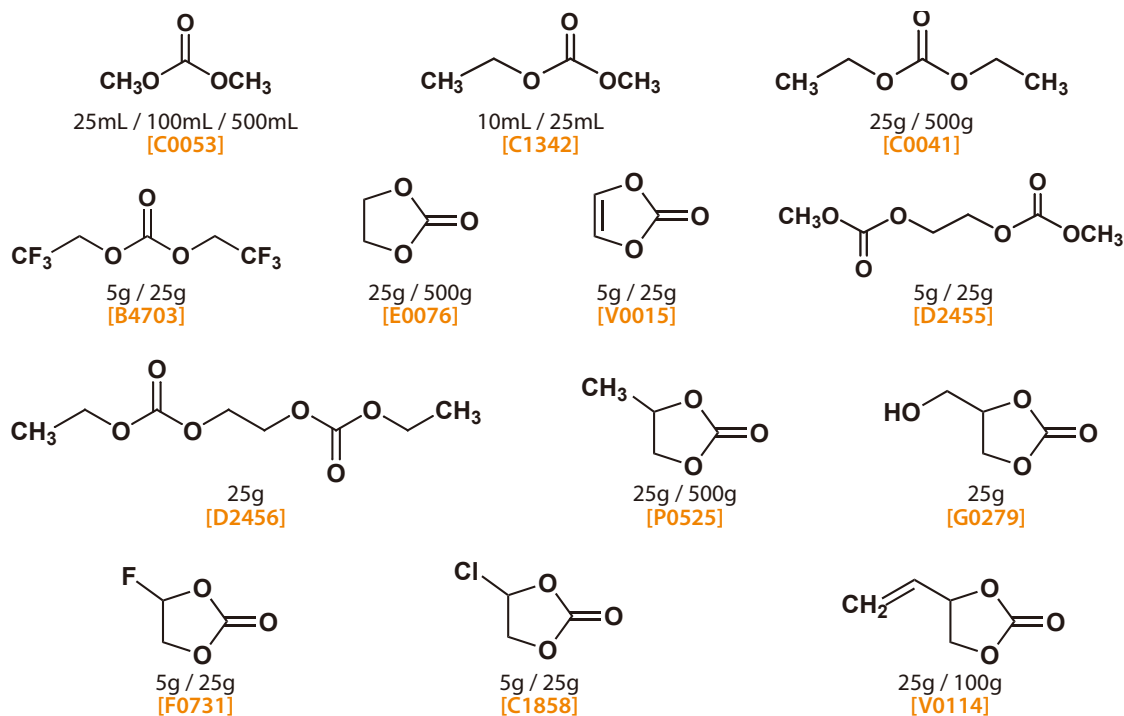
- Boric Acid Esters
- Carbonate Esters
 - Nitriles
- Sulfonyls and Related Compounds

✓ Other Related Products

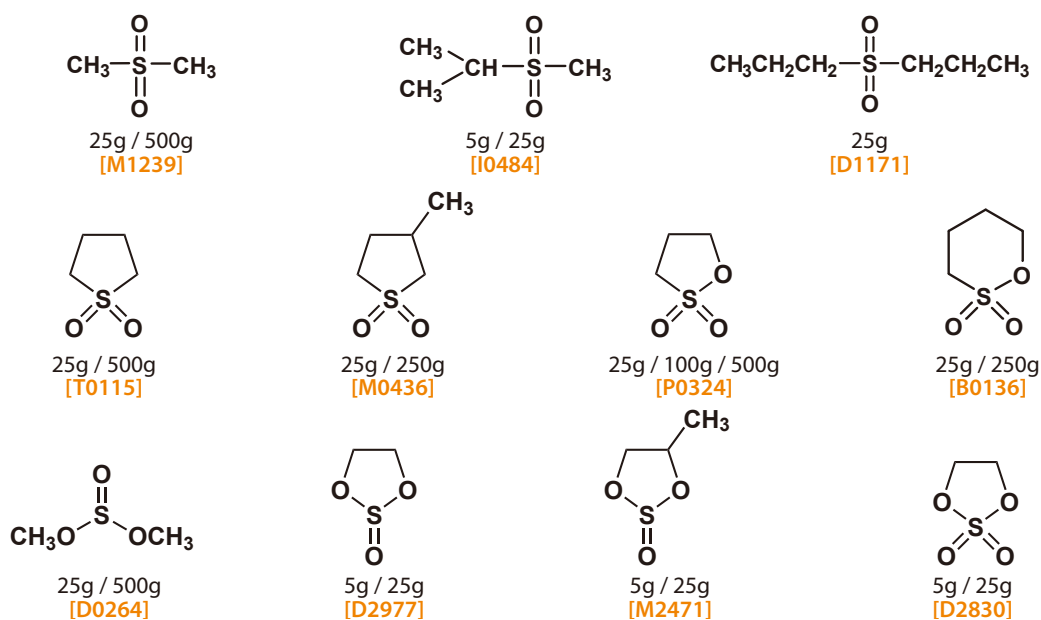
- For Secondary Battery Anode Use, Carbon Coated SiO/Mg Composite Material
- Air-Stable Antiaromatic Nickel(II) Norcorrole Complex

Lithium Battery Research Reagents

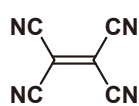
Carbonate Esters



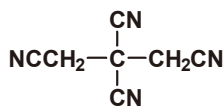
Sulfonyls and Related Compounds



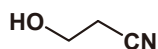
Nitriles



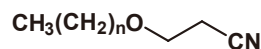
5g / 25g
[T0077]



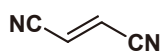
1g / 5g
[P1751]



25mL / 100mL / 500mL
[C0450]



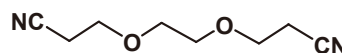
$n = 0$ 25mL / 500mL [M0653]
 $n = 1$ 25mL / 500mL [E0299]



5g / 25g
[F0072]



5mL / 25mL
[M0103]



25g / 100g
[E0108]

Lithium Salts



25g / 100g
[L0146]



25g
[L0133]



25g / 250g
[B2542]



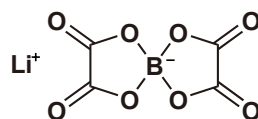
5g / 25g
[L0281]



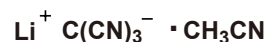
1g / 5g
[L0307]



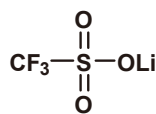
25g / 300g
[L0204]



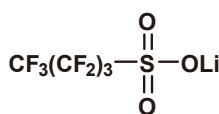
5g / 25g
[L0367]



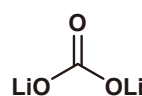
1g / 5g
[L0308]



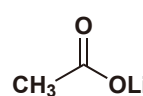
25g
[T1548]



25g
[N0710]

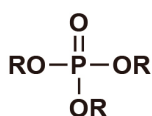


25g / 500g
[L0224]



25g / 500g
[L0191]

Phosphate Esters



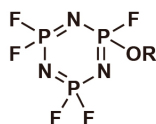
R = Methyl
R = Ethyl
R = Pentyl
R = Ethylhexyl
R = Butoxyethyl
R = CH₂CH=CH₂
R = CH(CH₂Cl)₂
R = CH₂CF₃
R = CH(CF₃)₂

25g / 500g [P0271]
25g / 500g [P0270]
5mL / 25mL [P0265]
25mL / 500mL [P1022]
25g / 500g [P0683]
25mL / 100mL [P0264]
25g / 500g [P0269]
5g / 25g [T3203]
1g / 5g [T3041]

R = CH₂(CF₂)₄H
R = Phenyl
R = o-Tolyl
R = m-Tolyl
R = p-Tolyl
R = Tollyl (mixture)
R = diPhenyl, o-Tolyl
R = diPhenyl, Ethylhexyl

10g [P1134]
25g / 500g [P0272]
5g / 25g [P1331]
5g [P1472]
5g / 25g [T2209]
25g / 500g [P0273]
25mL / 500mL [P0259]
25g / 500g [P1021]

Phosphazenes

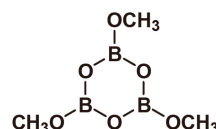


R = Ethyl 1g / 5g [E1140]
R = Phenyl 1g / 5g [P2286]



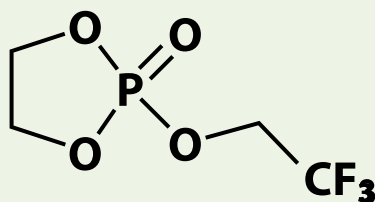
X = Cl 25g / 250g [C0584]
X = F 5g / 25g [H1429]
X = OPh 5g / 25g [H1356]

Borate Ester



25g / 100g [T1581]

Highly Flame-retardant Electrolyte Additive for Lithium-ion Battery TFEP



TFEP
1g / 5g
[E1456]

Advantages

- Cyclic phosphate ester with high flame retardance
- High oxidation potential due to containing fluorine atoms
- Improves battery cycle characteristics due to high solid electrolyte interphase (SEI) film formation capability
- Realizes high capacity by forming cathode electrolyte interface (CEI) layer (on NMC cathode)

Reference

- 1) K. Shima, K. Ishigaki, S. Yasukawa, S. Mori, Jpn. Pat. Appl. H11-067232 A, **1999**.
- 2) C. Su, Z. Zhang, *et al.*, *ACS Appl. Mater. Interfaces* **2017**, 9, 0686. DOI: <https://doi.org/10.1021/acsami.7b08953>
- 3) Q. Zheng, Y. Yamada, R. Shang, S. Ko, Y. Y. Lee, K. Kim, E. Nakamura, A. Yamada, *Nat. Energy* **2020**, 5, 291. DOI: <https://doi.org/10.1038/s41560-020-0567-z>

Related Products

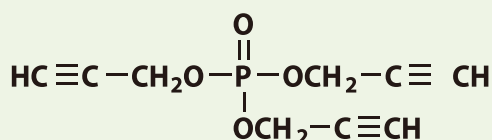
Electrolyte Solvents for Lithium-ion Battery

FEMC (= Methyl 2,2,2-Trifluoroethyl Carbonate)	5g / 25g [M3376]
EC (= Ethylene Carbonate)	25g / 500g [E0076]
DMC (= Dimethyl Carbonate)	25mL / 100mL / 500mL [C0053]

Lithium Electrolytes

LiFSI (= Lithium Bis(fluorosulfonyl)imide)	5g / 25g [L0281]
LiPF ₆ (= Lithium Hexafluorophosphate)	25g / 100g [L0146]
LiTFSI (= Lithium Bis(trifluoromethanesulfonyl)imide)	25g / 250g [B2542]

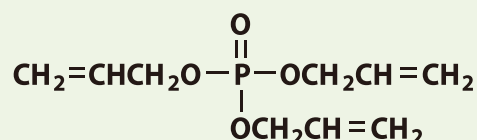
Phosphate Ester-type Electrolyte Additives



Tripropargyl Phosphate

5g / 25g

[T3987]



Triallyl Phosphate

25mL / 100mL

[P0264]

Advantages

- Polymerizes on the electrode surface to form stable SEI and CEI films.
- Contributes to maintaining excellent charge/discharge capacity under high voltage.
- Improves the performance and durability of lithium-ion batteries.
- Forms dense and protective interphases on both the NMC532 cathode and graphite anode.

References

Y. Qian, Y. Deng, *et al.*, *ACS Appl. Mater. Interfaces* **2020**, 12, 10443.

<https://doi.org/10.1021/acsami.9b21605>

J. Xia, J. R. Dahn, *J. Power Sources* **2015**, 295, 203.

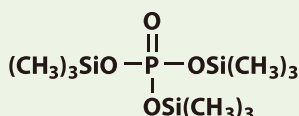
<https://doi.org/10.1016/j.jpowsour.2015.06.151>

Other Phosphate Ester-type Electrolyte Additives

$\text{RO}-\text{P}(=\text{O})(\text{OR})_2$	R = Methyl	25g / 500g [P0271]	R = CH(CF₃)₂	1g / 5g [T3041]
	R = Ethyl	25g / 500g [P0270]	R = CH₂(CF₂)₄H	10g [P1134]
	R = Pentyl	5mL / 25mL [P0265]	R = Phenyl	25g / 500g [P0272]
	R = Ethylhexyl	25mL / 500mL [P1022]	R = o-Tolyl	5g / 25g [P1331]
	R = Butoxyethyl	25g / 500g [P0683]	R = m-Tolyl	5g [P1472]
	R = CH₂CH=CH₂	25mL / 100mL [P0264]	R = p-Tolyl	5g / 25g [T2209]
	R = CH(CH₂Cl)₂	25g / 500g [P0269]	R = Tolyl (mixture)	25g / 500g [P0273]
	R = CH₂CF₃	5g / 25g [T3203]	R = diPhenyl, o-Tolyl	25mL / 500mL [P0259]
			R = diPhenyl, Ethylhexyl	25g / 500g [P1021]

Electrolyte Additives for Secondary Batteries

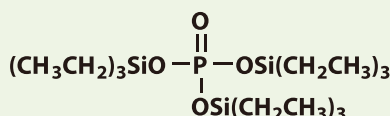
Tris(trialkylsilyl) Phosphates



Tris(trimethylsilyl) Phosphate

5g / 25g

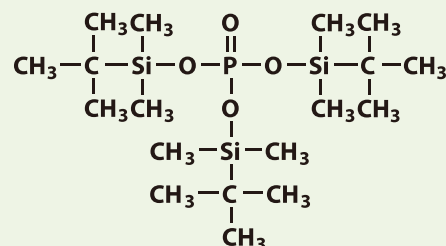
[P1248]



Tris(triethylsilyl) Phosphate

5g

[T4111]



Tris(tert-butyldimethylsilyl) Phosphate

5g

[T4119]

References

When **P1248** is used as an additive for lithium-ion batteries, the following features are reported :

- Forming an artificial solid electrolyte interface (SEI) layer
- Reducing an interface impedance
- Protecting an electrode material from eroding by hydrogen fluoride
- Enhancing initial discharge capacity
- Improving cyclic stability and capacity retention

TCI also offers **T4111** and **T4119** as the analogues.

Reference

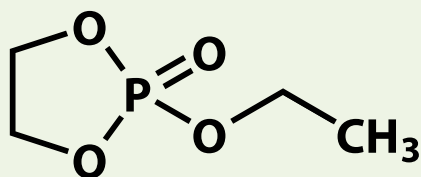
- 1) Tris(trimethylsilyl)phosphate: A film-forming additive for high voltage cathode material in lithium-ion batteries
G. Yan, X. Li, Z. Wang, H. Guo, C. Wang, *J. Power Sources* **2014**, 248, 1306. <https://doi.org/10.1016/j.jpowsour.2013.10.037>
- 2) Artificial Interface Deriving from Sacrificial Tris(trimethylsilyl)phosphate Additive for Lithium Rich Cathode Materials
J. Zhang, J. Wang, J. Yang, Y. NuLi, *Electrochim. Acta* **2014**, 117, 99. <https://doi.org/10.1016/j.electacta.2013.11.024>
- 2) Importance of Reduction and Oxidation Stability of High Voltage Electrolytes and Additives
S. A. Delp, O. Borodin, T. Jow, *et al.*, *Electrochim. Acta* **2016**, 209, 498. <https://doi.org/10.1016/j.electacta.2016.05.100>

Related Products

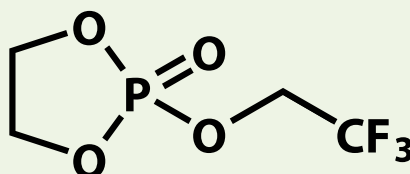
Tris(trimethylsilyl) Phosphite

5mL / 25mL **[P1217]**

Flame-retardant and Overcharge Protection Electrolyte Additives for Lithium-ion Battery



**2-Ethoxy-2-oxo-
1,3,2-dioxaphospholane**
1g / 5g
[E1458]



TFEP
1g / 5g
[E1456]

Advantages

- Cyclic phosphate esters with flame retardance
- Prevent sharp voltage rise and protect against overcharging
- Contribute to improved coulomb efficiency and cycle stability due to the SEI and CEI formations

References

Ethylene ethyl phosphate as a multifunctional electrolyte additive for lithium-ion batteries

D. Gao, J. B. Xu, M. Lin, Q. Xu, C. F. Ma, H. F. Xiang, *RSC Adv.* **2015**, 5, 17566.

<https://doi.org/10.1039/C4RA15899G>

Functionality Selection Principle for High Voltage Lithium-ion Battery Electrolyte Additives

C. Su, Z. Zhang, *et al.*, *ACS Appl. Mater. Interfaces* **2017**, 9, 30686.

<https://doi.org/10.1021/acsami.7b08953>

A cyclic phosphate-based battery electrolyte for high voltage and safe operation

Q. Zheng, Y. Yamada, R. Shang, S. Ko, Y. Lee, K. Kim, E. Nakamura, A. Yamada, *Nat. Energy* **2020** 5, 291.

<https://doi.org/10.1038/s41560-020-0567-z>

Related Products

Phosphate-type Electrolyte Additive for Lithium-ion Battery

TTFPa (= Tris(2,2,2-trifluoroethyl) Phosphate

5g / 25g **[T3203]**

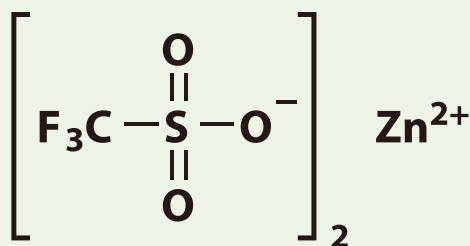
High Purity and High Solubility Zinc Electrolytes



Zinc Chloride
(High Purity & Low water content)

5g / 25g

[Z0053]



Zinc(II) Trifluoromethanesulfonate
[for Electrolyte]

5g / 25g

[Z0057]

Advantages

- High purity guarantee (>99.0%)
- Good solubility due to reduced impurities
(A 10M aqueous solution of **Z0053** and a 3M aqueous solution of **Z0057** can be prepared, respectively)
- Applicable to the preparation of zinc-based batteries with high performance and reproducibility

Related Products

Zinc(II) Bis(trifluoromethanesulfonyl)imide

1g / 5g **[Z0027]**

Zinc Acetate

25g / 500g **[Z0044]**

Zinc(II) Fluoride

25g / 500g **[Z0050]**

Zinc Bromide

25g / 300g **[Z0013]**

Lithium Electrolytes

$\text{Li}^+ \text{Cl}^-$
Lithium Chloride
Anhydrous
25g / 300g

[L0204]

$\text{Li}^+ \text{BF}_4^-$
Lithium
Tetrafluoroborate
25g

[L0133]

$\text{Li}^+ \text{PF}_6^-$
Lithium
Hexafluorophosphate
25g / 100g

[L0146]

$2\text{Li}^+ \text{B}_4\text{O}_7^{2-}$
Lithium Tetraborate
25g / 500g

[L0387]

$\text{Li}^+ \text{PO}_3^{2-}$
Lithium Metaphosphate
25g / 500g

[L0405]

$3\text{Li}^+ \text{PO}_4^{3-}$
Lithium Phosphate
25g / 100g

[L0374]

$\text{Li}^+ \text{ClO}_4^-$
Lithium Perchlorate
25g / 100g / 500g

[L0379]

$\text{Li}^+ \text{PO}_2\text{F}_2^-$
Lithium
Phosphorodifluoride
5g / 25g

[L0375]

$2\text{Li}^+ \text{CO}_3^{2-}$
Lithium Carbonate
25g / 500g

[L0224]

$\text{Li}^+ \text{CH}_3\text{COO}^-$
Lithium Acetate
25g / 500g

[L0191]

$\text{Li}^+ \text{CH}_3(\text{CH}_2)_{16}\text{COO}^-$
Lithium Stearate
25g / 500g

[S0237]

$\text{Li}^+ \text{CH}_3\text{COCO}_2^- \cdot \text{H}_2\text{O}$
Lithium
Pyruvate Monohydrate
25g

[P0659]

$\text{Li}^+ \text{CF}_3\text{SO}_3^-$
Lithium
Trifluoromethanesulfonate
25g

[T1548]

$\text{Li}^+ \text{CF}_3(\text{CF}_2)_3\text{SO}_3^-$
Lithium
Nonafluoro-1-butanesulfonate
25g

[N0710]

$\text{Li}^+ \text{C}(\text{CN})_3^- \cdot \text{CH}_3\text{CN}$
Lithium Tricyanomethanide -
Acetonitrile Complex
1g / 5g

[L0308]

$\text{Li}^+ (\text{FSO}_2)_2\text{N}^-$
Lithium
Bis(fluorosulfonyl)imide
5g / 25g

[L0281]

$\text{Li}^+ (\text{CF}_3\text{SO}_2)_2\text{N}^-$
Lithium
Bis(trifluoromethanesulfonyl)imide
25g / 250g

[B2542]

$\text{Li}^+ (\text{FSO}_2)(\text{CF}_3\text{SO}_2)\text{N}^-$
Lithium (Fluorosulfonyl)-
(trifluoromethanesulfonyl)imide
1g

[L0295]

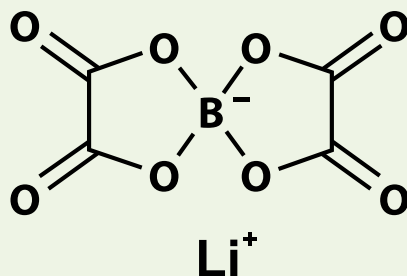
$\text{Li}^+ (\text{CF}_3\text{CF}_2\text{SO}_2)_2\text{N}^-$
Lithium
Bis(pentafluoroethanesulfonyl)imide
1g / 5g

[L0267]

$\text{Li}^+ (\text{C}_4\text{F}_9\text{SO}_2)_2\text{N}^-$
Lithium
Bis(nonafluorobutanesulfonyl)imide
1g / 5g

[L0307]

Fluorine-Free and Thermally-Stable Electrolyte for Lithium Ion Battery



Lithium Bis(oxalate)borate

5g / 25g

[L0367]

Advantages

- Suppresses battery deterioration of LIB and improves LIB cycle life
- High SEI forming ability and thermal stability
- Can be used as an alternative of traditional electrolytes or as an additive with traditional electrolytes

References

LITHIUM BISOXALATOBORATE, THE PRODUCTION THEREOF AND ITS USE AS A CONDUCTING SALT

U. Lischka, U. Wietelmann, M. Wegner, WO0000495A1, **1999**.

The effects of LiBOB additive for stable SEI formation of PP13TFSI-organic mixed electrolyte in lithium ion batteries

Y. An, P. Zuo, X. Cheng, L. Liao, G. Yin, *Electrochim. Acta* **2011**, 56, 4841.

DOI : <https://doi.org/10.1016/j.electacta.2011.01.125>

Lithium bis(oxalate)borate additive in the electrolyte to improve Li-rich layered oxide cathode materials

Z. Xiao, J. Liu, G. Fan, M. Yu, J. Liu, X. Gou, M. Yuan, F. Cheng, *Mater. Chem. Front.* **2020**, 4, 1689.

DOI : <https://doi.org/10.1039/D0QM00094A>

Synergistic electrolyte additives for enhancing the performance of high-voltage lithium-ion cathodes in half-cells and full-cells

A. Kazzazi, D. Bresser, S. Passerini, *et al.*, *J. Power Sources* **2021**, 482, 228975.

DOI: <https://doi.org/10.1016/j.jpowsour.2020.228975>

Related Products

Lithium Electrolytes

LiFSI (= Lithium Bis(fluorosulfonyl)imide)

5g / 25g **[L0281]**

LiPF₆ (= Lithium Hexafluorophosphate)

25g / 100g **[L0146]**

LiTFSI (= Lithium Bis(trifluoromethanesulfonyl)imide)

5g / 25g / 250g **[B2542]**

Practical Lithium Ion Battery Electrolytes with Low Water Content

LiPF₆	Li (CF₃SO₂)₂N	Li (FSO₂)₂N
Lithium Hexafluorophosphate	Lithium Bis(trifluoromethanesulfonyl)imide (= LiTFSI)	Lithium Bis(fluorosulfonyl)imide (= LiFSI)
25g / 100g [L0146]	5g / 25g / 100g [B2542]	5g / 25g [L0281]

Advantages

- Water content (<1000ppm) is guaranteed.
- Realize high performance and reproducible lithium ion secondary battery

In lithium-ion secondary batteries, the presence of water has a critical effect on battery degradation. It can be occurred by the hydrofluoric acid derivatives generated by the reaction of water with some fluorine-containing chemicals (additives) in electrolyte. To minimize battery degradation, TCI controls and guarantees the water content (<1000ppm) of some standard solid electrolytes.

Related Products

Lithium (Fluorosulfonyl)(trifluoromethanesulfonyl)imide	1g [L0295]
Lithium Bis(pentafluoroethanesulfonyl)imide	1g / 5g [L0267]
Lithium Bis(nonafluorobutanesulfonyl)imide	1g / 5g [L0307]
Lithium Trifluoromethanesulfonate	25g [T1548]
Lithium Nonafluoro-1-butanesulfonate	25g [N0710]
Lithium Phosphorodifluoridate	5g / 25g [L0375]
Lithium Tetrafluoroborate	25g [L0133]
Lithium Carbonate	25g / 500g [L0224]
Lithium Tricyanomethanide - Acetonitrile Complex	1g / 5g [L0308]
Lithium Sulfate	100g / 500g [L0371]
Lithium Tetraborate	25g / 500g [L0387]
Lithium Niobate	5g / 25g [L0376]
Lithium Chloride Anhydrous	25g / 300g [L0204]

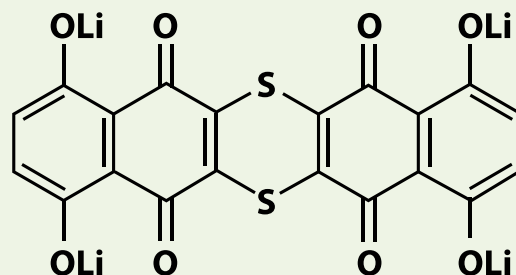
Lithium-Based Electrode Materials

Product Name	Abbrev.	Purity	Particle size	Volt. (V) ^[1]	Act. capacity (mAh/g) ^[2]	Package size, Product number
Lithium Cobalt(III) Oxide	LCO	>99.5%	≤23 μm	3.7	148	25g/100g [L0384]
Lithium Nickel Oxide	LNO	>99.9%	≤23 μm	3.7	160	25g [L0394]
Lithium Manganese(III,IV) Oxide	LMO	>99.5%	≤48 μm	3.7	120	25g / 100g [L0389]
Lithium Nickel Manganese Cobalt Oxide ($\text{LiNi}_{0.33}\text{Mn}_{0.33}\text{Co}_{0.33}\text{O}_2$)	NMC 333	>99.9%	≤48 μm	3.7	160	25g / 100g [L0388]
Lithium Nickel Manganese Cobalt Oxide ($\text{LiNi}_{0.8}\text{Mn}_{0.1}\text{Co}_{0.1}\text{O}_2$)	NMC 811	>99.9%	≤48 μm	3.7	200	25g / 100g [L0396]
Lithium Nickel Manganese Cobalt Oxide ($\text{LiNi}_{0.6}\text{Mn}_{0.2}\text{Co}_{0.2}\text{O}_2$)	NMC 622	>99.9%	≤48 μm	3.7	170	25g / 100g [L0397]
Lithium Nickel Manganese Cobalt Oxide ($\text{LiNi}_{0.4}\text{Mn}_{0.4}\text{Co}_{0.2}\text{O}_2$)	NMC 442	>99.9%	≤48 μm	3.7	-	25g / 100g [L0400]
Lithium Nickel Cobalt Aluminium Oxide ($\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$)	NCA	>99.9%	≤45 μm	3.7	199	25g / 100g [L0392]
Lithium Nickel Cobalt Oxide ($\text{LiNi}_{0.8}\text{Co}_{0.2}\text{O}_2$)	LNCO	>99.9%	≤48 μm	4	184	5g / 25g [L0415]
Lithium Iron(II) Phosphate	LFP	>99.5%	≤23 μm	3.2	160	25g / 100g [L0386]
Lithium Manganese(II) Phosphate	LMP	>99.9%	≤45 μm	4.1	168	5g / 25g [L0390]
Lithium Cobalt(II) Phosphate	LCP	>99.9%	≤120 μm	4.8	135	5g / 25g [L0407]
Lithium Nickel(II) Phosphate	LNP	>99.9%	≤10 μm	5.1	160	5g / 25g [L0402]
Lithium Manganese Nickel Oxide ($\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$)	LMNO	>99.9%	≤48 μm	4.65	135	25g / 100g [L0391]
Lithium Vanadium Phosphate ($\text{Li}_3\text{V}_2(\text{PO}_4)_3$)	LVP	>99.9%	≤48 μm	4	197	5g / 25g [L0417]
Lithium Titanate (Spinel)	LTO	>99.9%	≤15 μm	LTO	175 (Theoretical Capacity)	25g / 100g [L0380]

[1] Average voltage as a reference value vs Li+/Li, not an ensured value

[2] Average actual capacity as a reference value, not an ensured value

High Capacity Organic Positive-electrode Material DNP-Li



DNP-Li

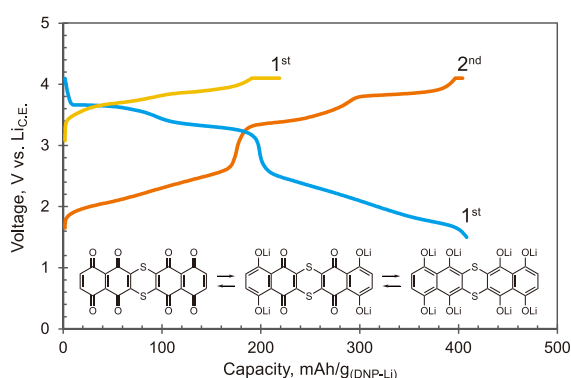
100mg / 500mg

[D5947]

Advantages

- Naphthazarin-based positive electrode material
- Multielectron-transfer type redox reaction
- High capacity (416 mAh/g) and energy density (1.1 Wh/g)
- Long cycle-life (300 mAh/g after 100 cycles)

Typical charge/discharge curves during initial cycles (cited from Reference)



Appearance



Application (preparation of electrodes and cells)

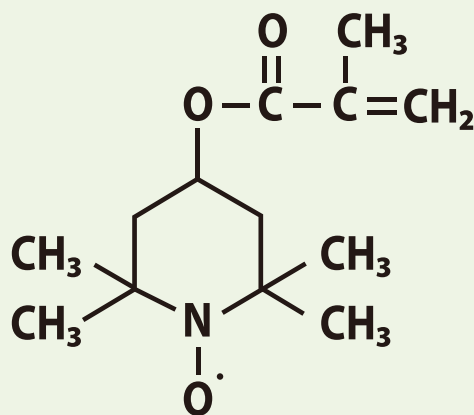
As a positive-electrode, composite sheet composed of DNP-Li (a few milligrams per electrode), acetylene black, and PTFE is prepared by mixing them. The sheet is then pressed onto a mesh-type aluminum current collector. The battery performance is examined by assembling IEC R2032 coin-type cells with a positive-electrode, a lithium metal negative-electrode, separator, and electrolyte solution.

Reference M. Yao, N. Taguchi, H. Ando, N. Takeichi, T. Kiyobayashi, *Commun. Mater.* **2020**, 1, 70. <https://doi.org/10.1038/s43246-020-00071-5>

This product was are commercialized under an invention license by the National Institute of Advanced Industrial Science and Technology (AIST), Japan.

Organic Free Radical Monomer

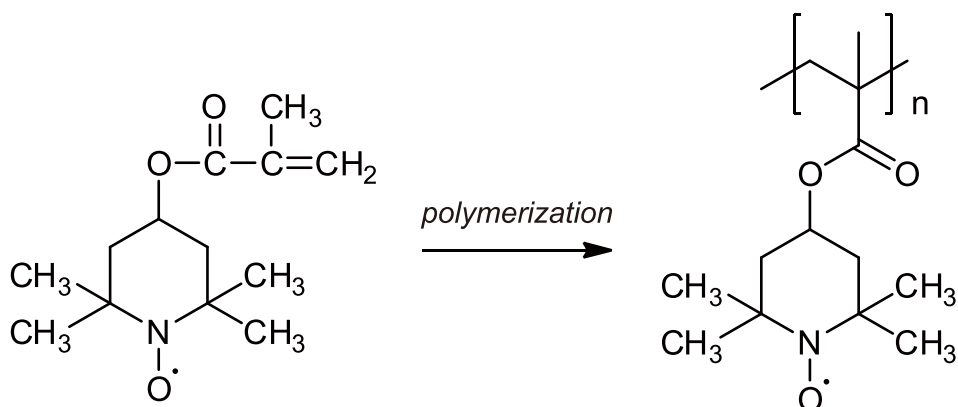
TEMPO Methacrylate



[M1531]

- TEMPO Methacrylate is a monomer containing stable free radical.
- The polymer of TEMPO Methacrylate shows redox ability and magnetism.

Applications



Redox Polymer

References

- 1) *Chem. Mater.* **2007**, 19, 2910.
- 2) *J. Power Sources* **2010**, 195, 6212.
- 3) *Chem. Comm.* **2011**, 47, 1249.

Magnetic Polymer

References

- 1) *J. Phys. Soc. Jpn.* **1996**, 65, 1427.
- 2) *J. Polym. Sci.* **2007**, 45, 521.

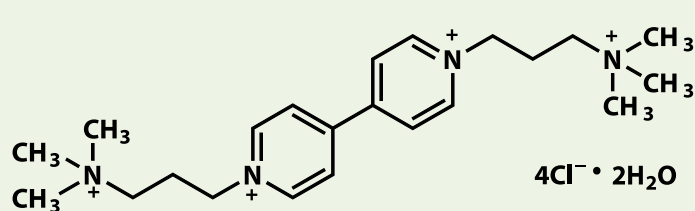
4-Methacryloyloxy-TEMPO Free Radical

1g / 5g [M1531]

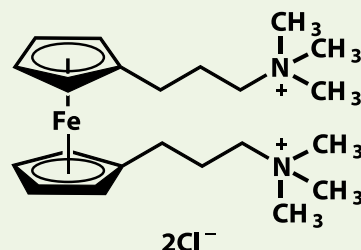
Organic free radical compounds such as DOXYL and PROXYL, etc. are in our catalog.

If you need products not listed, please contact us. We can provide any other product on your request.

Neutral pH Aqueous Redox Flow Battery Materials BTMAP-Vi, BTMAP-Fc



BTMAP-Vi
[B5659]



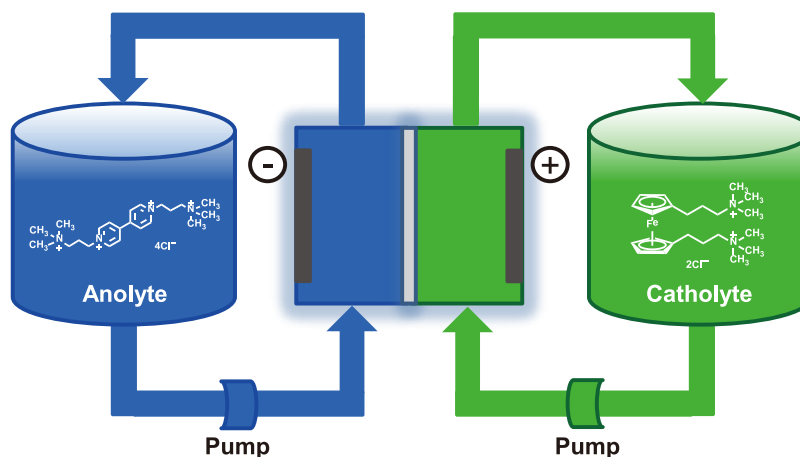
BTMAP-Fc
[B5660]

Advantages

- High solubility (2.0 M in H_2O)
- Operable at neutral pH
- Reduction potential -0.358 V for BTMAP-Vi and oxidation potential +0.390 V for BTMAP-Fc (vs SHE)
- High capacity retention (99.9989%/cycle at 0.75-1.00 M)

Application

Redox flow battery with BTMAP based electrolytes



Reference E. S. Beh, D. De Porcellinis, R. L. Gracia, K. T. Xia, R. G. Gordon, M. J. Aziz, *ACS Energy Lett.* **2017**, 2, 639.

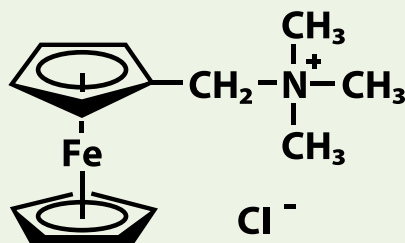
Related Products

BTMAP-Vi Dihydrate
BTMAP-Fc

5g **[B5659]**

5g **[B5660]**

Neutral pH Aqueous Redox Flow Battery Material FcNCl



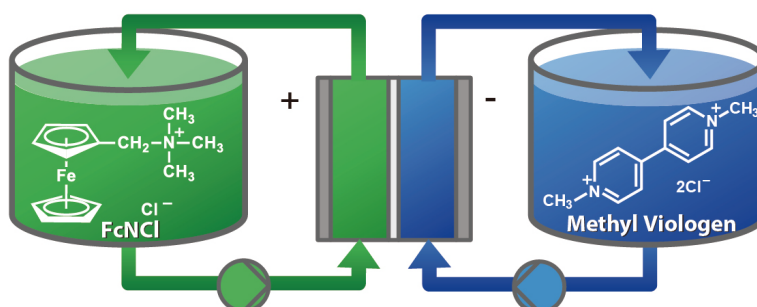
FcNCl
1g / 5g
[F1231]

Advantages

- Excellent solubility (4.0M in water, 3.0M in 2.0M NaCl)
- High theoretical energy density (45.5 Wh/L)
- High capacity retention (99.99% per cycle at 0.5M)
- Operates at neutral pH

Application

Catholyte for aqueous redox flow batteries



Reference B. Hu, C. DeBruler, Z. Rhodes, T. L. Liu, *J. Am. Chem. Soc.* **2017**, 139, 1207.

DOI: <https://doi.org/10.1021/jacs.6b10984>

This product was commercialized by collaboration with Dr. Tianbiao (Leo) Liu.

Related Products

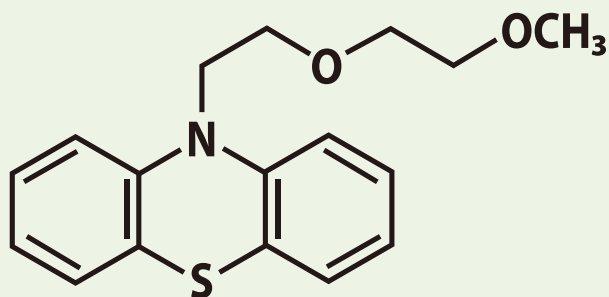
BTMAP-Fc

5g [B5660]

BTMAP-Vi Dihydrate

5g [B5659]

Non-Aqueous Redox Flow Battery Material MEEPT

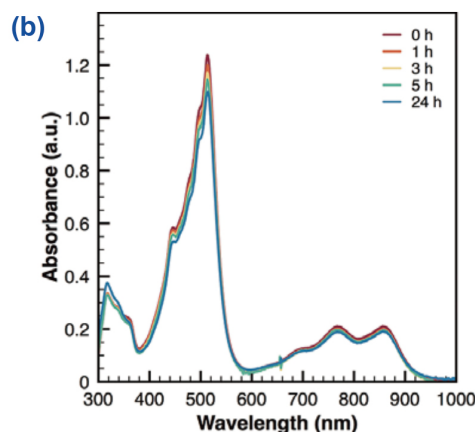
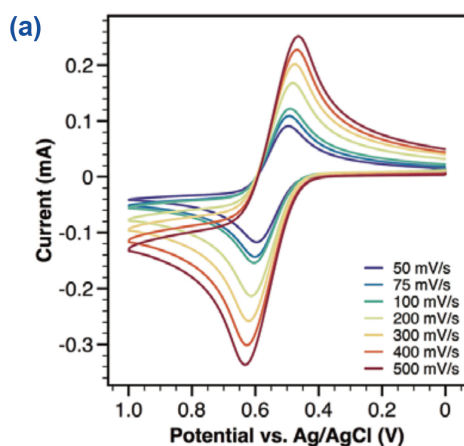


[M3068]

Advantages

- Catholyte for non-aqueous redox flow battery (RFB)
- High current density
- Long duration cycling
- Miscible with non-aqueous organic solvents and electrolytes
- Oxidation potentials : 0.31 V (vs Fc/Fc⁺) in TEA-BF₄ MeCN solution; 3.60 V (vs. Li/Li⁺) in LiPF₆-EC/EMC

Electrochemical and Spectral Properties of MEEPT/MEEPT⁺



(a) Cyclic voltammogram of MEEPT at 10 mM in 0.1 M TBAPF₆ in DCM recorded at scan rates from 10 to 500 mV/s
 (b) UV-vis spectra of MEEPT-SbCl₆ at 0.15 mM in acetonitrile for up to 24 h after dissolution

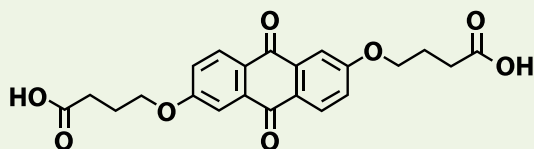
These graphical materials were provided by Prof. Odom.

Reference J. D. Milshtein, A. P. Kaur, M. D. Casselman, J. A. Kowalski, S. Modekrutti, P. L. Zhang, N. H. Attanayake, C. F. Elliott, S. R. Parkin, C. Risko, F. R. Brushett, S. A. Odom, *Energy Environ. Sci.* 2016, 9, 3531.

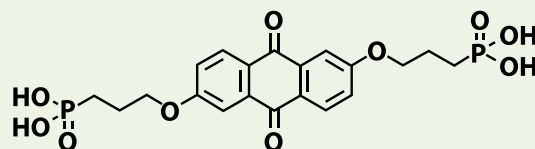
10-[2-(2-Methoxyethoxy)ethyl]-10H-phenothiazine (= MEEPT) 10g [M3068]

This material was produced by collaboration with Prof. Susan Odom at University of Kentucky.

Long Lifetime, Alkaline-Water Soluble Redox Flow Battery Materials



2,6-DBEAQ
5g
[D5764]



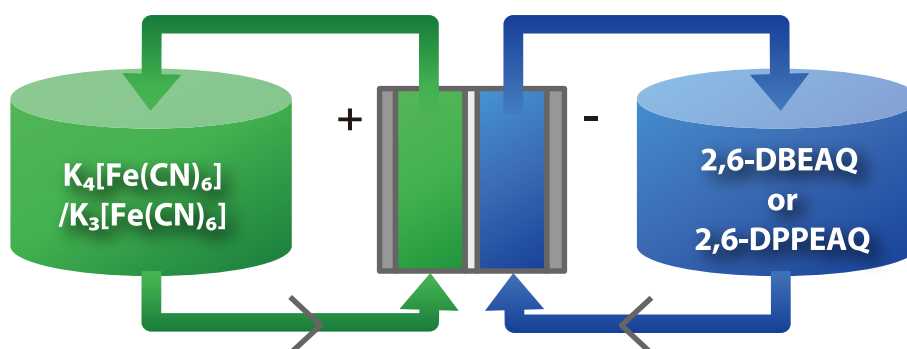
2,6-DPPEAQ
5g
[D5765]

Features	2,6-DBEAQ ¹⁾	2,6-DPPEAQ ²⁾
Solubility ³⁾	0.5 M (pH 12)	0.75 M (pH 9)
Redox potential (vs SHE) ³⁾	-0.515 V	-0.47 V
Open-circuit voltage ⁴⁾	>1 V	>1 V
Fade rate	<0.01% per day	0.014% per day

Reference 1) Publication data for 2,6-DBEAQ: D. G. Kwabi, K. Lin, Y. Ji, E. F. Kerr, M.-A. Goulet, D. De Porcellinis, D. P. Tabor, D. A. Pollack, A. Aspuru-Guzik, R. G. Gordon, M. J. Aziz, *Joule* **2018**, 2, 1894.
 2) Publication data for 2,6-DPPEAQ: Y. Ji, M.-A. Goulet, D. A. Pollack, D. G. Kwabi, S. Jin, D. De Porcellinis, E. F. Kerr, R. G. Gordon, M. J. Aziz, *Adv. Energy Mater.* **2019**, 1900039.
 3) Measured by cyclic voltammetry in KOH aqueous solution.
 4) Measured with potassium ferricyanide/ferrocyanide as a positive electrolyte.

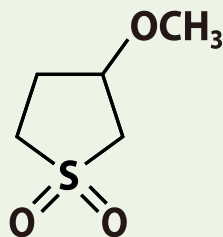
Application

Negative electrolyte for alkaline aqueous redox flow battery



For more details
See Reference 1) and 2) above

High Purity and Low Water Content Sulfolane-type Electrolyte Solvent MESL



MESL
5g / 25g
[M3380]

Advantages

- Excellent chemical and physical properties, Thermal stability
- Good electrochemical properties
- Enable to prepare 1 mol/L LiTFSI solution
- Purity > 99.0%, Water content < 1000ppm

Physical Properties

	Melting Point	Heat Generation Temperature	Vapor Pressure (373K)	Potential Window [†]	Electric Resistance [†] (-20°C)	Electric Resistance [†] (20°C)
MESL [M3380]	-39 °C	449 °C	7.2 Pa	6.9 V	8521 Ω · cm	221 Ω · cm
Sulfolane [T0115]	29 °C	210 °C	36.4 Pa	6.4 V	- (Solidified)	50 Ω · cm

[†] 1 mol/L LiPF₆ solution (Data taken from PCT Inter. Appli. WO2013/145890A)

References

- 1) Electroconduction of Lithium Perchlorate Solutions in Sulfones
V. S. Kolosnitsyn, N. V. Slobodchikova, L. V. Sheina, *Russ. J. Electrochem.* **2001**, 37, 599.
DOI : <https://doi.org/10.1023/A:1016666517462>
- 2) Cycling a Sulfur Electrode : Effect of Physicochemical Properties of Electrolyte Systems
V. S. Kolosnitsyn, E. V. Karaseva, D. Y. Seung, M. D. Cho, *Russ. J. Electrochem.* **2003**, 39, 1089.
DOI : <https://doi.org/10.1023/A:1026123504203>

Related Products

Sulfonyl-type Electrolyte Solvents

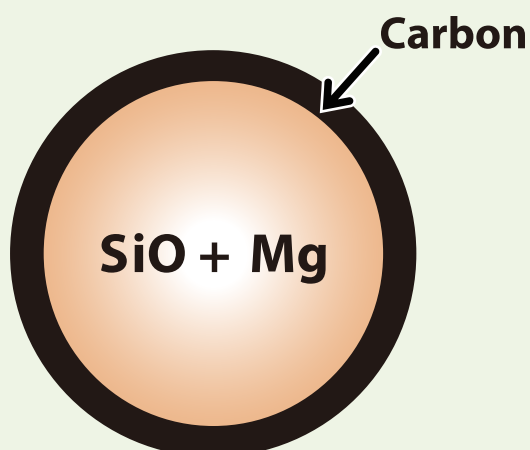
Sulfolane	25g / 500g	[T0115]
3-Methylsulfolane	25g / 250g	[M0436]
Dimethyl Sulfone	25g / 500g	[M1239]
Isopropyl Methyl Sulfone	5g / 25g	[I0484]
Dipropyl Sulfone	25g / 500g	[E0076]
Dimethyl Sulfite	25g / 500g	[D0264]
Ethylene Sulfite	5g / 25g	[D2977]
1,2-Propylene Sulfite	5g / 25g	[M2471]
Ethylene Sulfate	5g / 25g	[D2830]
1,3-Propanesultone	25g / 100g / 500g	[P0324]
1,4-Butanesultone	25g / 250g	[B0136]

Lithium Electrolytes

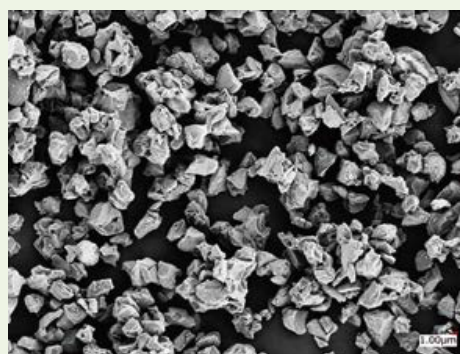
LiFSI (= Lithium Bis(fluorosulfonyl)imide)	5g / 25g	[L0281]
LiPF₆ (= Lithium Hexafluorophosphate)	25g / 100g	[L0146]
LiTFSI (= Lithium Bis(trifluoromethanesulfonyl)imide)	5g / 25g / 250g	[B2542]

For Secondary Battery Anode Use, Carbon Coated SiO/Mg Composite Material

Carbon coated Silicon Monoxide/Magnesium composite material



25g / 100g **[C3864]**



SEM image

Features

- Useful as a battery anode material
- Capacity : SiO/Mg > SiO
- First cycle efficiency : SiO/Mg > SiO
- Cycle characteristics : SiO/Mg \approx SiO

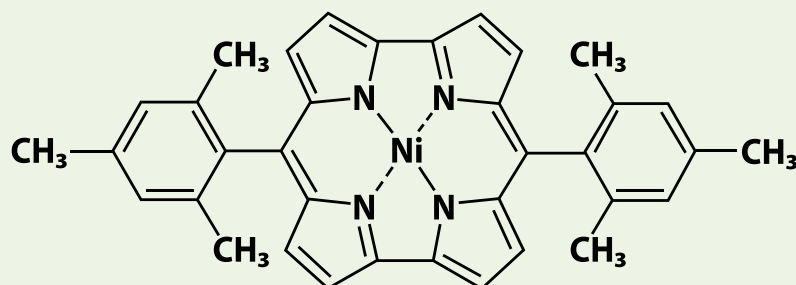
Product specification

Item	SiO/Mg spec
Specific surface area	$\geq 2.0 \text{ m}^2/\text{g}$
Carbon content	10-12 w/w%
Particle size	$\leq 10.0 \text{ }\mu\text{m}$

Battery characteristics (reference values)

Item	SiO/Mg	SiO
Capacity	1805 mAh/g	1573 mAh/g
First cycle efficiency	80%	72%

Air-Stable Antiaromatic Nickel(II) Norcorrole Complex



Ni(II) *meso*-Dimesitylnorcorrole

50mg / 200mg

[N1236]

Advantages

- Air-stable 16 π -electronic porphyrin analogue showing antiaromaticity
- Narrow HOMO-LUMO gap (1.51 eV) and multi-electron storage capacity peculiar to antiaromatics

Applications

Used as an active material for lithium-metal batteries and lithium-free batteries

H. Shinokubo *et. al.*, *Angew. Chem. Int. Ed.* **2014**, 53, 3096.

<https://doi.org/10.1002/anie.201310374>

Exhibits aromaticity by forming stacked norcorrole dimer

H. Shinokubo *et. al.*, *Nat. Commun.* **2019**, 10, 3576.

<https://doi.org/10.1038/s41467-019-11467-4>

See more information for
Porphyrin Complexes;



<https://bit.ly/46pTN6Q>

See more information for
Battery Materials;



<https://bit.ly/3Px4aQu>

Battery Additives

Battery Cathode Active Materials

D5947	DNP-Li		100mg / 500mg
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Nitriles

F0072	Fumaronitrile	>98.0%(GC)	5g / 25g
P1751	1,2,2,3-Propanetetracarbonitrile	>96.0%(GC)	1g / 5g
T0077	Tetracyanoethylene	>98.0%(N)	5g / 25g
T3264	Tetracyanoethylene (purified by sublimation)	>99.0%(N)	1g / 5g

Phosphate Esters

E1456	2-(2,2,2-Trifluoroethoxy)-1,3,2-dioxaphospholane 2-Oxide	>95.0%(NMR)	1g / 5g
E1458	2-Ethoxy-1,3,2-dioxaphospholane 2-Oxide	>95.0%(GC)	1g / 5g
P0259	Cresyl Diphenyl Phosphate (mixture of analogue)		25ml / 500ml
P0264	Triallyl Phosphate	>96.0%(GC)	25ml / 100ml
P0265	Triamyl Phosphate	>98.0%(GC)	5ml / 25ml
P0269	Tris(1,3-dichloro-2-propyl) Phosphate	>90.0%(GC)	25g / 500g
P0270	Triethyl Phosphate	>99.0%(GC)	25g / 500g
P0271	Trimethyl Phosphate	>98.0%(GC)	25g / 500g
P0272	Triphenyl Phosphate	>99.0%(GC)	25g / 500g
P0273	Tricresyl Phosphate (mixture of isomers)	>99.0%(GC)	25g / 500g
P0683	Tris(2-butoxyethyl) Phosphate	>95.0%(GC)	25g / 500g
P1021	2-Ethylhexyl Diphenyl Phosphate	>90.0%(GC)	25g / 500g
P1022	Tris(2-ethylhexyl) Phosphate	>98.0%(GC)	25ml / 500ml
P1134	Tris(1H,1H,5H-octafluoropentyl) Phosphate	>95.0%(GC)	10g
P1217	Tris(trimethylsilyl) Phosphite	>95.0%(NMR)	5ml / 25ml
P1248	Tris(trimethylsilyl) Phosphate	>98.0%(GC)	5g / 25g
P1331	Tri-o-cresyl Phosphate	>97.0%(GC)	5g / 25g
P1472	Tri-m-cresyl Phosphate	>95.0%(GC)	5g
T2209	Tri-p-cresyl Phosphate	>98.0%(GC)	5g / 25g
T3041	Tris(1,1,1,3,3,3-hexafluoro-2-propyl) Phosphate	>98.0%(GC)	1g / 5g
T3203	Tris(2,2,2-trifluoroethyl) Phosphate	>96.0%(GC)	5g / 25g
T3447	Tris(2-chloroethyl) Phosphate	>93.0%(GC)	25g / 100g
T3987	Tripropargyl Phosphate	>98.0%(GC)	5g / 25g
T3991	Tris(2,2,2-trifluoroethyl) Phosphite	>98.0%(GC)	5g / 25g
T4111	Tris(triethylsilyl) Phosphate	>95.0%(GC)	5g
T4119	Tris(tert-butyldimethylsilyl) Phosphate	>95.0%(GC)	5g

Phosphazenes

C0584	Phosphonitrilic Chloride Trimer	>98.0%(GC)	25g / 250g
E1140	Ethoxy(pentafluoro)cyclotriphosphazene	>98.0%(GC)	1g / 5g
H1356	Hexaphenoxycyclotriphosphazene	>98.0%(HPLC)(N)	5g / 25g
P2286	Pentafluoro(phenoxy)cyclotriphosphazene	>98.0%(GC)	1g / 5g

Battery Electrolytes

Lithium Electrolytes

B2542	Lithium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	25g / 250g
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L0133	Lithium Tetrafluoroborate	>98.0%(T)	25g
L0146	Lithium Hexafluorophosphate	>97.0%(T)	25g / 100g
L0191	Lithium Acetate	>98.0%(T)	25g / 500g
L0204	Lithium Chloride Anhydrous	>98.0%(T)	25g / 300g
L0210	Lithium Bromide	>99.0%(T)	25g / 100g / 500g
L0212	Lithium Iodide (99.9%, trace metals basis) (Low water content)	>97.0%(T)	5g / 25g
L0224	Lithium Carbonate	>98.0%(T)	25g / 500g
L0281	Lithium Bis(fluorosulfonyl)imide	>98.0%(T)	5g / 25g
L0267	Lithium Bis(pentafluoroethanesulfonyl)imide	>98.0%(T)	1g / 5g
L0295	Lithium (Fluorosulfonyl)(trifluoromethanesulfonyl)imide	>95.0%(T)	1g
L0307	Lithium Bis(nonafluorobutanesulfonyl)imide	>95.0%(T)	1g / 5g
L0308	Lithium Tricyanomethanide - Acetonitrile Complex	>98.0%(T)	1g / 5g
L0364	Lithium Sulfide		5g / 25g
L0367	Lithium Bis(oxalate)borate	>95.0%(T)	5g / 25g
L0371	Lithium Sulfate	>98.0%(T)	100g / 500g
L0373	Lithium Tantalate (99.99%, trace metals basis)		5g / 25g
L0374	Lithium Phosphate	>96.0%(T)	25g / 100g
L0375	Lithium Phosphorodifluoridate	>98.0%(T)	5g / 25g
L0376	Lithium Niobate (99.99%, trace metals basis)		5g / 25g
L0379	Lithium Perchlorate	>98.0%(T)	25g / 100g / 500g
L0384	Lithium Cobalt(III) Oxide		25g / 100g
L0386	Lithium Iron(II) Phosphate		25g / 100g
L0387	Lithium Tetraborate		25g / 500g
L0388	Lithium Nickel Manganese Cobalt Oxide (LiNi _{0.33} Mn _{0.33} Co _{0.33} O ₂)		25g / 100g
L0389	Lithium Manganese(III,IV) Oxide		25g / 100g
L0390	Lithium Manganese(II) Phosphate		5g / 25g
L0391	Lithium Manganese Nickel Oxide (LiMn _{1.5} Ni _{0.5} O ₄)		25g / 100g
L0392	Lithium Nickel Cobalt Aluminium Oxide (LiNi _{0.8} Co _{0.15} Al _{0.05} O ₂)		25g / 100g
L0394	Lithium Nickel Oxide		25g
L0396	Lithium Nickel Manganese Cobalt Oxide (LiNi _{0.8} Mn _{0.1} Co _{0.1} O ₂)		25g / 100g
L0397	Lithium Nickel Manganese Cobalt Oxide (LiNi _{0.6} Mn _{0.2} Co _{0.2} O ₂)		25g / 100g
L0398	Lithium Nickel Manganese Cobalt Oxide (LiNi _{0.5} Mn _{0.3} Co _{0.2} O ₂)		25g / 100g
L0399	Lithium Metasilicate		25g / 100g
L0400	Lithium Nickel Manganese Cobalt Oxide (LiNi _{0.4} Mn _{0.4} Co _{0.2} O ₂)		25g / 100g
L0401	Lithium Germanium Phosphorus Sulfide (Li ₁₀ GeP ₂ S ₁₂)		1g / 5g
L0402	Lithium Nickel(II) Phosphate		5g / 25g
L0403	Lithium Oxide	>98.0%(T)	5g / 25g
L0405	Lithium Metaphosphate		25g / 500g
L0407	Lithium Cobalt(II) Phosphate		5g / 25g
L0408	Lithium 4,5-Dicyano-2-(trifluoromethyl)imidazol-1-ide	>98.0%(T)(HPLC)	1g / 5g
L0409	Lithium Aluminum Titanium Phosphate (Li _{1.3} Al _{0.3} Ti _{1.7} (PO ₄) ₃)		5g / 25g
L0410	Lithium Hexafluoroarsenate(V)	>98.0%(T)	5g / 25g
L0411	Lithium Hexafluoroantimonate		5g / 25g
L0415	Lithium Nickel Cobalt Oxide (LiNi _{0.8} Co _{0.2} O ₂)		5g / 25g
L0416	Lithium Titanium Phosphate (LiTi ₂ (PO ₄) ₃)		5g / 25g
L0417	Lithium Vanadium Phosphate (Li ₃ V ₂ (PO ₄) ₃)		5g / 25g
L0418	LATSP (Li _{1+x+y} Al _x Ti _{2-x} Si _y P _{3-y} O ₁₂)		5g
L0420	Lithium [(Nonafluorobutyl)sulfonyl][(trifluoromethyl)sulfonyl]azanide	>98.0%(T)	1g / 5g
L0441	Lithium Metaborate	>98.0%(T)	25g / 100g

N0710	Lithium Nonafluoro-1-butanesulfonate	>95.0%(T)	25g
P0659	Lithium Pyruvate Monohydrate [Guaranteed for Standard to GOT, GPT]	>95.0%(T)	25g
S0237	Lithium Stearate	>90.0%(T)	25g / 500g
T1548	Lithium Trifluoromethanesulfonate	>98.0%(T)	25g

Metal Electrolytes (Other)

B2543	Potassium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
O0489	Sodium Tricyanomethanide	>98.0%(T)	5g / 25g
O0494	Sodium Tetrafluoroborate	>95.0%(T)	25g / 500g
P1023	Potassium Hexafluorophosphate	>95.0%(T)	25g / 100g / 500g
P2410	Potassium (Fluorosulfonyl)(trifluoromethanesulfonyl)imide	>97.0%(T)	1g / 5g
P2520	Potassium Tris(trifluoromethanesulfonyl)methanide	>98.0%(T)	1g / 5g
P2538	Potassium Tricyanomethanide	>98.0%(T)	1g / 5g
P2565	Potassium Tetrafluoroborate	>95.0%(T)	25g / 500g
S0392	Sodium Hexafluorophosphate	>98.0%(T)	25g
Z0013	Zinc Bromide	>98.0%(T)	25g / 300g
Z0027	Zinc(II) Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	1g / 5g
Z0044	Zinc Acetate	>98.0%(T)	25g / 500g
Z0050	Zinc(II) Fluoride		25g / 500g
Z0053	Zinc Chloride (High Purity & Low water content)	>99.0%(T)	5g / 25g
Z0057	Zinc(II) Trifluoromethanesulfonate [for Electrolyte]	>99.0%(T)	5g / 25g

Electrode Materials

L0380	Lithium Titanate (Spinel)		25g / 100g
L0384	Lithium Cobalt(III) Oxide		25g / 100g
L0386	Lithium Iron(II) Phosphate		25g / 100g
L0388	Lithium Nickel Manganese Cobalt Oxide (LiNi0.33Mn0.33Co0.33O2)		25g / 100g
L0389	Lithium Manganese(III,IV) Oxide		25g / 100g
L0390	Lithium Manganese(II) Phosphate		5g / 25g
L0391	Lithium Manganese Nickel Oxide (LiMn1.5Ni0.5O4)		25g / 100g
L0392	Lithium Nickel Cobalt Aluminium Oxide (LiNi0.8Co0.15Al0.05O2)		25g / 100g
L0394	Lithium Nickel Oxide		25g
L0396	Lithium Nickel Manganese Cobalt Oxide (LiNi0.8Mn0.1Co0.1O2)		25g / 100g
L0397	Lithium Nickel Manganese Cobalt Oxide (LiNi0.6Mn0.2Co0.2O2)		25g / 100g
L0400	Lithium Nickel Manganese Cobalt Oxide (LiNi0.4Mn0.4Co0.2O2)		25g / 100g
L0402	Lithium Nickel(II) Phosphate		5g / 25g
L0407	Lithium Cobalt(II) Phosphate		5g / 25g
L0415	Lithium Nickel Cobalt Oxide (LiNi0.8Co0.2O2)		5g / 25g
L0417	Lithium Vanadium Phosphate (Li3V2(PO4)3)		5g / 25g

Ionic Liquids

Ammonium Salts

A2274	Amyltriethylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g
B3233	Butyltrimethylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g
B5427	Benzyl(ethyl)dimethylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g
C1966	Cyclohexyltrimethylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(N)	5g

D5237	Diethyl(methyl)propylammonium Bis(fluorosulfonyl)imide	>98.0%(N)	1g
D5238	Diethyl(2-methoxyethyl)methylammonium Bis(fluorosulfonyl)imide	>98.0%(N)	1g
D6156	N,N-Diethyl-2-methoxy-N-methylethan-1-aminium Bis[(trifluoromethyl)sulfonyl]amide	>98.0%(T)	5g
E1275	Ethyl(2-methoxyethyl)dimethylammonium Bis(fluorosulfonyl)imide	>98.0%(T)	1g
E1281	Ethyl(2-methoxyethyl)dimethylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g
E1282	Ethyl(3-methoxypropyl)dimethylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g
E1283	Ethyl(dimethyl)(2-phenylethyl)ammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	1g / 5g
M1660	Methyltri-n-octylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(N)	5g
T0054	Tetrabutylammonium Bromide	>98.0%(T)	25g / 100g / 500g
T0055	Tetrabutylammonium Chloride	>98.0%(T)	5g / 25g / 100g
T0057	Tetrabutylammonium Iodide	>98.0%(T)	25g / 100g / 500g
T0914	Tetrabutylammonium Tetrafluoroborate	>98.0%(N)	25g / 100g / 500g
T1010	Tetrahexylammonium Iodide	>98.0%(T)	5g / 25g
T1011	Tetraamylammonium Iodide	>98.0%(T)	5g / 25g
T1155	Tetra-n-octylammonium Iodide	>98.0%(T)	5g
T1279	Tetrabutylammonium Hexafluorophosphate	>98.0%(T)	25g / 250g
T1396	Tetraheptylammonium Iodide	>98.0%(T)	25g
T1432	Tetraamylammonium Bromide	>98.0%(T)	5g / 25g
T1433	Tetraamylammonium Chloride	>98.0%(T)	5g / 25g
T1568	Tetrabutylammonium Trifluoromethanesulfonate	>98.0%(T)	10g / 25g
T1599	Tetrahexylammonium Bromide	>98.0%(T)	25g
T1602	Tetraheptylammonium Bromide	>98.0%(T)	5g / 25g / 100g
T1603	Tetra-n-octylammonium Bromide	>98.0%(T)	10g / 25g
T2106	Tetrapropylammonium Chloride	>97.0%(T)	25g
T2679	Tributylmethylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
T2694	Tetrabutylammonium Acetate	>90.0%(T)	25g / 100g
T2761	Trimethylpropylammonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
T3533	Tributyl(methyl)ammonium Dicyanamide	>98.0%(N)	5g
T3660	Tetrabutylammonium p-Toluenesulfonate	>98.0%(T)	5g / 25g
T3692	Tributylmethylammonium Iodide	>98.0%(T)	5g / 25g

Imidazolium Salts

A2084	1-Allyl-3-methylimidazolium Chloride	>98.0%(T)(HPLC)	5g / 25g
A2765	1-Allyl-3-methyl-1H-imidazol-3-ium Bromide	>98.0%(T)(HPLC)	5g / 25g
A3210	1-Allyl-3-methylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(HPLC)	5g / 25g
B2193	1-Butyl-3-methylimidazolium Bromide	>98.0%(T)(HPLC)	5g
B2194	1-Butyl-3-methylimidazolium Chloride	>98.0%(T)(HPLC)	5g / 25g / 100g
B2195	1-Butyl-3-methylimidazolium Tetrafluoroborate	>98.0%(HPLC)(N)	5g / 25g / 100g
B2320	1-Butyl-3-methylimidazolium Hexafluorophosphate	>98.0%(HPLC)(N)	5g / 25g
B2337	1-Butyl-3-methylimidazolium Trifluoromethanesulfonate	>98.0%(N)	5g / 25g
B2473	1-Butyl-2,3-dimethylimidazolium Chloride	>98.0%(T)(HPLC)	5g / 25g
B2474	1-Butyl-2,3-dimethylimidazolium Hexafluorophosphate	>97.0%(T)(N)	5g / 25g
B2475	1-Butyl-2,3-dimethylimidazolium Tetrafluoroborate	>98.0%(HPLC)(N)	5g / 25g
B2477	1-Butyl-3-methylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g / 25g
B2672	1-Butyl-3-methylimidazolium Tetrachloroferrate	>98.0%(T)	5g / 25g
B2708	1-Butyl-3-methylimidazolium Iodide	>96.0%(HPLC)(N)	5g / 25g
B3159	1-Butyl-2,3-dimethylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
B3231	1-Butyl-3-methylimidazolium Methanesulfonate	>98.0%(HPLC)(N)	5g / 25g
B3542	1-Butyl-3-methylimidazolium Trifluoro(trifluoromethyl)borate	>98.0%(HPLC)	5g

Imidazolium Salts

B3596	1-Butyl-3-methylimidazolium Tribromide	>98.0%(T)(HPLC)	5g
B4091	1-Butyl-3-methylimidazolium Thiocyanate	>97.0%(T)	5g / 25g
B4182	1-Butyl-2,3-dimethylimidazolium Trifluoromethanesulfonate	>98.0%(HPLC)(N)	5g / 25g
B5103	1-Butyl-3-methyl-1H-imidazol-3-ium Nitrate	>98.0%(T)(HPLC)	5g / 25g
B5421	3,3'-(Butane-1,4-diyl)bis(1-vinyl-3-imidazolium) Bis(trifluoromethanesulfonyl)imide	>98.0%(HPLC)	1g
B5447	1-Butyl-3-methylimidazolium Dicyanamide	>96.0%(HPLC)(N)	5g / 25g
B5487	1-Butyl-3-methylimidazolium Tricyanomethanide	>98.0%(HPLC)(N)	5g / 25g
B5526	1-Butyl-3-methylimidazolium Trifluoroacetate	>97.0%(T)	5g / 25g
B5527	1-Butyl-3-methylimidazolium Methyl Sulfate	>98.0%(HPLC)	5g / 25g
B5543	1-Benzyl-3-methylimidazolium Chloride	>98.0%(T)(HPLC)	5g / 25g
B5569	1-Butyl-3-methylimidazolium Hydrogen Sulfate	>97.0%(HPLC)(N)	5g / 25g
B5582	1-Butyl-3-methylimidazolium Acetate	>95.0%(T)(HPLC)	5g / 25g
B5724	1-Butyl-3-methylimidazolium Hexafluoroantimonate	>98.0%(HPLC)(N)	5g / 25g
B5725	1-Benzyl-3-methylimidazolium Tetrafluoroborate	>98.0%(HPLC)(N)	5g / 25g
B5726	1-Benzyl-3-methylimidazolium Hexafluorophosphate	>98.0%(HPLC)(N)	5g / 25g
B6344	3-Butyl-1-methyl-1H-imidazol-3-ium 4-Methylbenzenesulfonate	>98.0%(T)(HPLC)	5g / 25g
B6428	1-Butyl-3-vinyl-1H-imidazol-3-ium Bromide	>98.0%(T)(HPLC)	5g / 25g
C3870	3-(Carboxymethyl)-1-methyl-1H-imidazol-3-ium Chloride	>98.0%(T)(HPLC)	25g
D3240	1,3-Dimethylimidazolium Dimethyl Phosphate	>97.0%(N)	5g / 25g
D3341	1,3-Dimethylimidazolium Chloride	>98.0%(T)	5g / 25g
D3903	1,2-Dimethyl-3-propylimidazolium Iodide	>98.0%(T)(HPLC)	5g / 25g
D4289	2,3-Dimethyl-1-propylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
D4351	1-Decyl-3-methylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g / 25g
D4654	1,3-Dimethylimidazolium Iodide	>98.0%(T)(HPLC)	5g / 25g
D5348	1,3-Dimethylimidazolium Methyl Sulfate	>98.0%(HPLC)(N)	5g / 25g
D5349	1,3-Dimethylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(HPLC)	5g / 25g
D5350	1-Decyl-3-methylimidazolium Bromide	>98.0%(HPLC)	5g / 25g
D5351	1-Decyl-3-methylimidazolium Chloride	>96.0%(HPLC)	5g / 25g
D5352	1-Dodecyl-3-methyl-1H-imidazol-3-ium Chloride	>95.0%(T)	5g / 25g
D5356	1-Dodecyl-3-methylimidazolium Bromide	>98.0%(T)(HPLC)	5g / 25g
D5373	1-Decyl-3-methylimidazolium Tetrafluoroborate	>98.0%(HPLC)(N)	5g / 25g
D5694	1-Dodecyl-3-methylimidazolium Bis(trifluoromethanesulfonyl)imide	>95.0%(T)	5g / 25g
D6005	1,3-Dimethyl-1H-imidazol-3-ium Tetrafluoroborate	>97.0%(T)	5g / 25g
E0490	1-Ethyl-3-methylimidazolium Chloride	>98.0%(T)(HPLC)	5g / 25g / 250g
E0493	1-Ethyl-3-methylimidazolium Hexafluorophosphate	>98.0%(T)	5g / 25g
E0494	1-Ethyl-3-methylimidazolium Trifluoromethanesulfonate	>98.0%(T)	5g / 25g
E0496	1-Ethyl-3-methylimidazolium Tetrafluoroborate	>97.0%(N)	5g / 25g
E0543	1-Ethyl-3-methylimidazolium Bromide	>98.0%(T)	5g / 25g
E0556	1-Ethyl-3-methylimidazolium Iodide	>98.0%(T)(HPLC)	5g / 25g
E0599	1-Ethyl-3-methylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g / 25g
E0650	1-Ethyl-3-methylimidazolium Ethyl Sulfate	>98.0%(HPLC)(N)	5g / 25g
E0680	1-Ethyl-3-methylimidazolium Dicyanamide	>97.0%(HPLC)(N)	1g / 5g
E0706	1-Ethyl-3-methylimidazolium Tetrachloroferrate	>98.0%(T)	5g
E0753	1-Ethyl-2,3-dimethylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(N)	5g / 25g
E0755	1-Ethyl-3-methylimidazolium Methanesulfonate	>98.0%(N)	5g / 25g
E0775	1-Ethyl-3-methylimidazolium Nitrate	>98.0%(T)(HPLC)	5g / 25g
E0776	1-Ethyl-3-methylimidazolium Thiocyanate	>98.0%(T)(HPLC)	5g / 25g
E0836	1-Ethyl-3-methylimidazolium Trifluoro(trifluoromethyl)borate	>98.0%(HPLC)	5g
E0883	1-Ethyl-3-methylimidazolium Acetate	>94.0%(HPLC)	5g / 25g

E1280	3-Ethyl-1-vinylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(HPLC)	5g
E1298	1-Ethyl-3-methylimidazolium Tricyanomethanide	>98.0%(HPLC)(N)	5g / 25g
E1307	1-Ethyl-3-methylimidazolium Trifluoroacetate	>97.0%(T)	5g / 25g
E1308	1-Ethyl-3-methylimidazolium Methyl Sulfate	>98.0%(HPLC)	5g / 25g
E1309	1-Ethyl-3-methylimidazolium Diethyl Phosphate	>96.0%(T)(HPLC)	5g / 25g
E1452	3-Ethyl-1-methyl-1H-imidazol-3-ium Bis(fluorosulfonyl)azanide	>98.0%(T)(HPLC)	5g / 25g
E1520	3-Ethyl-1-methyl-1H-imidazol-3-ium Dimethyl Phosphate	>98.0%(T)(HPLC)	5g / 25g
H1097	1-Hexyl-3-methylimidazolium Chloride	>98.0%(T)	5g / 25g
H1098	1-Hexyl-3-methylimidazolium Hexafluorophosphate	>98.0%(T)(N)	5g / 25g
H1099	1-Hexyl-3-methylimidazolium Tetrafluoroborate	>97.0%(N)	5g / 25g
H1100	1-Hexyl-3-methylimidazolium Trifluoromethanesulfonate	>98.0%(T)(HPLC)	5g
H1227	1-Hexyl-3-methylimidazolium Bromide	>98.0%(T)(HPLC)	5g / 25g
H1254	1-(2-Hydroxyethyl)-3-methylimidazolium Chloride	>98.0%(HPLC)	5g / 25g
H1286	1-Hexyl-2,3-dimethylimidazolium Iodide	>98.0%(T)(HPLC)	5g
H1423	1-Hexyl-3-methylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g / 25g
H1492	1-(2-Hydroxyethyl)-3-methylimidazolium Tetrafluoroborate	>98.0%(HPLC)	5g / 25g
H1632	1-Hexadecyl-3-methylimidazolium Chloride	>96.0%(T)(HPLC)	5g / 25g
H1633	1-Hexyl-3-methylimidazolium Iodide	>98.0%(HPLC)	5g / 25g
H1670	1-(2-Hydroxyethyl)-3-methylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g / 25g
H1801	3-Hexadecyl-1-methyl-1H-imidazol-3-ium Bromide	>97.0%(T)(HPLC)	25g
M1440	1-Methyl-3-propylimidazolium Iodide	>97.0%(T)(HPLC)	5g / 25g
M1904	1-Methyl-3-n-octylimidazolium Bromide	>98.0%(HPLC)	5g / 25g
M2062	1-Methyl-3-n-octylimidazolium Chloride	>98.0%(T)(HPLC)	5g / 25g
M2063	1-Methyl-3-n-octylimidazolium Hexafluorophosphate	>98.0%(HPLC)(N)	5g / 25g
M2440	1-Methyl-3-n-octylimidazolium Trifluoromethanesulfonate	>98.0%(HPLC)(N)	5g / 25g
M2732	1-Methyl-3-n-octylimidazolium Tetrafluoroborate	>97.0%(HPLC)(N)	5g / 25g
M3034	1-Methyl-3-propylimidazolium Bromide	>98.0%(T)(HPLC)	5g / 25g
M3035	1-Methyl-3-propylimidazolium Chloride	>98.0%(T)(HPLC)	5g / 25g
M3036	1-Methyl-3-propylimidazolium Tetrafluoroborate	>98.0%(HPLC)(N)	5g / 25g
M3037	1-Methyl-3-pentylimidazolium Bromide	>98.0%(HPLC)	5g / 25g
M3039	1-Methyl-3-n-octylimidazolium Bis(trifluoromethanesulfonyl)imide	>97.0%(HPLC)	5g / 25g
M3059	1-Methyl-3-propylimidazolium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g / 25g
M3119	1-Methyl-3-(4-sulfobutyl)imidazolium Bis(trifluoromethanesulfonyl)imide	>95.0%(T)	1g / 5g
M3120	1-Methyl-3-(4-sulfobutyl)imidazolium Hydrogen Sulfate	>95.0%(T)	5g / 25g
M3210	1-Methylimidazole Bis(trifluoromethanesulfonyl)imide	>97.0%(HPLC)	5g / 25g
M3211	1-Methyl-1H-imidazol-3-ium Hexafluorophosphate	>98.0%(T)(HPLC)	5g / 25g
M3212	1-Methylimidazole Hydrobromide	>98.0%(T)(HPLC)	5g / 25g
M3214	1-Methylimidazole Trifluoromethanesulfonate	>98.0%(T)(HPLC)	5g / 25g
M3446	1-Methyl-3-[3-(trimethoxysilyl)propyl]-1H-imidazol-3-ium Chloride	>95.0%(T)(HPLC)	1g / 5g
V0145	1-Vinylimidazole Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g
V0183	3-Ethyl-1-vinyl-1H-imidazol-3-ium Bromide	>95.0%(T)(HPLC)	5g / 25g

Morpholinium Salts

E1166	4-Ethyl-4-methylmorpholinium Bromide	>97.0%(T)	5g / 25g
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Phosphonium Salts

H1047	Tributylhexadecylphosphonium Bromide	>98.0%(T)	25g
M1455	Tributylmethylphosphonium Iodide	>98.0%(T)	5g / 25g
O0297	Tributyl-n-octylphosphonium Bromide	>98.0%(T)	25g

Phosphonium Salts

T1124	Tetrabutylphosphonium Bromide	>99.0%(T)	25g / 100g / 500g
T1650	Tetra-n-octylphosphonium Bromide	>98.0%(T)	25g
T2006	Tetrabutylphosphonium Tetrafluoroborate	>97.0%(T)	25g
T2007	Tetrabutylphosphonium Hexafluorophosphate	>98.0%(T)	5g / 25g
T2564	Tributyl(2-methoxyethyl)phosphonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
T2680	Tributylmethylphosphonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g
T3534	Trihexyl(tetradecyl)phosphonium Dicyanamide	>93.0%(N)	5g / 25g
T3623	Trihexyl(tetradecyl)phosphonium Chloride	>97.0%(T)	5g / 25g
T3641	Tributyl(ethyl)phosphonium Diethyl Phosphate	>96.0%(T)	5g / 25g
T3840	Tributylhexylphosphonium Bromide	>98.0%(T)	5g / 25g
T3945	Tributyl(methyl)phosphonium Dimethyl Phosphate	>95.0%(T)	25g / 100g
T3946	Tetrabutylphosphonium O,O-Diethyl Phosphorodithioate	>95.0%(T)	25g / 100g
T4093	Trihexyl(tetradecyl)phosphonium Bis((trifluoromethyl)sulfonyl)amide		5g / 25g

Piperidinium Salts

B3424	1-Butyl-1-methylpiperidinium Bromide	>97.0%(T)	5g / 25g
B4844	1-Butyl-1-methylpiperidinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
M1976	1-Methyl-1-propylpiperidinium Bromide	>98.0%(T)	5g / 25g
M2981	1-Methyl-1-propylpiperidinium Bis(fluorosulfonyl)imide	>98.0%(T)	1g
M3488	1-Methyl-1-propylpiperidin-1-ium Bis((trifluoromethyl)sulfonyl)amide	>98.0%(T)(qNMR)	5g / 25g

Pyridinium Salts

B1329	1-Butylpyridinium Chloride	>98.0%(T)	10g / 25g
B1743	1-Butylpyridinium Bromide	>98.0%(T)(HPLC)	5g / 25g
B2196	1-Butylpyridinium Hexafluorophosphate	>98.0%(T)(HPLC)	5g / 25g
B2700	1-Butyl-4-methylpyridinium Bromide	>98.0%(T)(HPLC)	5g / 25g
B2701	1-Butyl-4-methylpyridinium Hexafluorophosphate	>97.0%(T)	5g / 25g
B3104	1-Butyl-3-methylpyridinium Bromide	>98.0%(T)(HPLC)	5g / 25g
B3232	1-Butylpyridinium Tetrafluoroborate	>94.0%(N)	5g / 25g
B3425	1-Butyl-3-methylpyridinium Chloride	>98.0%(T)(HPLC)	1g / 5g
B3426	1-Butyl-4-methylpyridinium Chloride	>99.0%(T)(HPLC)	5g / 25g
B5570	1-Butyl-4-methylpyridinium Tetrafluoroborate	>98.0%(HPLC)	5g / 25g
B5571	1-Butylpyridinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g / 25g
B5763	1-Butyl-4-methylpyridinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	1g / 5g
E0171	1-Ethylpyridinium Bromide	>98.0%(T)(HPLC)	25g
E0544	1-Ethylpyridinium Chloride	>98.0%(T)	5g / 25g
E0681	1-Ethyl-3-methylpyridinium Ethyl Sulfate	>98.0%(HPLC)(N)	5g / 25g
E0682	1-Ethyl-3-(hydroxymethyl)pyridinium Ethyl Sulfate		5g
E0756	1-Ethyl-3-methylpyridinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g
E1240	1-Ethyl-2-methylpyridinium Bromide	>98.0%(T)(HPLC)	1g / 5g
E1272	1-Ethyl-4-methylpyridinium Bromide	>98.0%(T)(HPLC)	5g / 25g
H1424	1-Hexylpyridinium Hexafluorophosphate	>98.0%(T)(HPLC)	5g / 25g
M3195	1-Methylpyridinium Hexafluorophosphate	>98.0%(HPLC)	5g / 25g
M3199	1-Methylpyridinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)(HPLC)	5g
P1393	1-Propylpyridinium Chloride	>98.0%(T)	5g

Pyrrolidinium Salts

A3089	1-Allyl-1-methylpyrrolidinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g
B2851	1-Butyl-1-methylpyrrolidinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
B3358	1-Butyl-1-methylpyrrolidinium Chloride	>98.0%(T)	5g / 25g
B3427	1-Butyl-1-methylpyrrolidinium Bromide	>97.0%(T)	5g / 25g
B5398	1-Butyl-1-methylpyrrolidinium Bis(fluorosulfonyl)imide	>98.0%(T)	5g
B5453	1-Butyl-1-methylpyrrolidinium Dicyanamide	>98.0%(T)	5g / 25g
B5568	1-Butyl-1-methylpyrrolidinium Trifluoromethanesulfonate	>98.0%(N)	5g / 25g
B6039	1-Butyl-1-methylpyrrolidinium Hexafluorophosphate	>98.0%(N)	5g / 25g
B6277	1-Butyl-1-methylpyrrolidinium Tetrafluoroborate	>98.0%(T)	5g / 25g
E0977	1-Ethyl-1-methylpyrrolidinium Tetrafluoroborate	>98.0%(N)	5g / 25g
E1050	1-Ethyl-1-methylpyrrolidinium Bromide	>97.0%(T)	5g / 25g
E1498	1-Ethyl-1-methylpyrrolidin-1-ium Bis[(trifluoromethyl)sulfonyl]amide	>95.0%(T)	5g / 25g
H1824	1-Hexyl-1-methylpyrrolidin-1-ium Bis((trifluoromethyl)sulfonyl)amide	>95.0%(T)(N)	5g / 25g
M2098	1-Methyl-1-propylpyrrolidinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
M2980	1-Methyl-1-propylpyrrolidinium Bis(fluorosulfonyl)imide	>98.0%(T)	5g / 25g
M2998	1-(2-Methoxyethyl)-1-methylpyrrolidinium Bis(fluorosulfonyl)imide	>98.0%(T)	1g / 5g
M3117	1-Methyl-1-n-octylpyrrolidinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g / 25g
M3118	1-Methyl-1-pentylpyrrolidinium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	1g / 5g
M3496	1-Methyl-1-propylpyrrolidin-1-ium Bromide	>98.0%(T)	5g / 25g
M3499	1-Methyl-1-octylpyrrolidin-1-ium Chloride	>98.0%(T)	1g / 5g

Sulfonium Salts

T1056	Trimethylsulfonium Iodide	>98.0%(T)	25g / 500g
T1564	Tributylsulfonium Iodide	>95.0%(T)	1g
T2314	Triethylsulfonium Bis(trifluoromethanesulfonyl)imide	>98.0%(T)	5g

Organic Redox Flow Battery Materials

Organic Active Materials (Others)

A3154	10-Acetylphenothiazine	>98.0%(GC)	1g / 5g
B5659	1,1'-Bis[3-(trimethylammonio)propyl]-4,4'-bipyridinium Tetrachloride Dihydrate	>98.0%(HPLC)	5g
B5660	1,1'-Bis[3-(trimethylammonio)propyl]ferrocene Dichloride	>97.0%(HPLC)	5g
E1430	Ethylviologen Dibromide	>98.0%(T)(HPLC)	1g / 5g
F1231	(Ferrocenylmethyl)trimethylammonium Chloride	>95.0%(T)(qNMR)	1g / 5g
M3068	10-[2-(2-Methoxyethoxy)ethyl]-10H-phenothiazine	>98.0%(GC)	10g

Organic Radicals

A1343	4-Amino-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>97.0%(GC)	1g / 5g
A1348	4-Acetamido-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical [Catalyst for Oxidation]	>98.0%(GC)	5g / 25g
A3235	4-Amino-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical (purified by sublimation)	>98.0%(GC)	200mg / 1g
B5642	Bis(2,2,6,6-tetramethyl-4-piperidyl-1-oxyl) Sebacate	>98.0%(T)	1g / 5g
C1406	3-Carboxy-2,2,5,5-tetramethylpyrrolidine 1-Oxyl Free Radical	>98.0%(T)(HPLC)	1g
C1428	4-Carboxy-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>97.0%(GC)(T)	100mg / 1g
C1432	4-(2-Chloroacetamido)-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>96.0%(HPLC)	100mg / 1g
C1782	4-Cyano-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>95.0%(T)	1g
G0020	Galvinoxyl Free Radical		1g / 5g

Organic Radicals

G0555	4-Glycidyloxy-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>95.0%(GC)(T)	1g / 5g
H0865	4-Hydroxy-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>98.0%(GC)	5g / 25g
H0878	4-Hydroxy-2,2,6,6-tetramethylpiperidine 1-Oxyl Benzoate Free Radical [Catalyst for Oxidation]	>97.0%(GC)(T)	1g / 5g
I0486	4-Isothiocyanato-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>97.0%(GC)(T)	100mg
I0487	4-(2-Iodoacetamido)-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>98.0%(HPLC)	100mg
M1197	4-Methoxy-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical [Catalyst for Oxidation]	>98.0%(GC)(T)	1g / 5g
M1531	4-Methacryloyloxy-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>98.0%(GC)(T)	1g / 5g
O0266	4-Oxo-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical	>95.0%(GC)(T)	5g / 25g
O0521	4-Oxo-2,2,6,6-tetramethylpiperidine 1-Oxyl Free Radical (purified by sublimation)	>98.0%(GC)	1g
T1560	2,2,6,6-Tetramethylpiperidine 1-Oxyl Free Radical	>98.0%(GC)(T)	5g / 25g
T3169	2,2,6,6-Tetramethyl-4-(2-propynyloxy)piperidine 1-Oxyl Free Radical	>98.0%(GC)(T)	1g / 5g
T3751	2,2,6,6-Tetramethylpiperidine 1-Oxyl Free Radical (purified by sublimation)	>99.0%(GC)(T)	1g / 5g

Quinones and Analogues

A0308	Disodium Anthraquinone-2,6-disulfonate	>98.0%(T)(HPLC)	5g / 25g
A0505	Dipotassium Anthraquinone-1,8-disulfonate	>98.0%(T)	25g
A0506	Anthraquinone-1,5-disulfonic Acid Disodium Salt	>95.0%(HPLC)	25g
A1428	Sodium Anthraquinone-1-sulfonate	>98.0%(HPLC)	25g / 250g
D5764	2,6-DBEAQ	>95.0%(T)(HPLC)	5g
D5765	2,6-DPPEAQ	>90.0%(T)	5g
V0136	2,2'-(2-Vinylanthracene-9,10-diylidene)bis(1,3-dithiole)	>98.0%(GC)	100mg / 500mg
V0137	2,2'-(2-Vinylanthracene-9,10-diylidene)dimalononitrile	>98.0%(HPLC)	1g / 5g
V0139	2-Vinylanthraquinone	>98.0%(GC)	1g / 5g

Organic Solvents

Boric Acid Esters

B0522	Trimethyl Borate	>98.0%(T)	25ml / 100ml / 500ml
B2094	Trihexyl Borate	>98.0%(T)	5g / 25g
T1581	2,4,6-Trimethoxyboroxin	>96.0%(T)	25g / 100g
T3010	Tris(2,2,2-trifluoroethyl) Borate	>95.0%(T)	1g

Carbonate Esters

B4703	Bis(2,2,2-trifluoroethyl) Carbonate	>98.0%(GC)	5g / 25g
C0040	Dibutyl Carbonate	>98.0%(GC)	5g / 25g
C0041	Diethyl Carbonate	>98.0%(GC)	25g / 500g
C0053	Dimethyl Carbonate	>98.0%(GC)	25ml / 100ml / 500ml
C1342	Ethyl Methyl Carbonate	>98.0%(GC)	10ml / 25ml
C1858	4-Chloro-1,3-dioxolan-2-one	>95.0%(GC)	5g / 25g
D2455	Dimethyl 2,5-Dioxahexanedioate	>98.0%(GC)	5g / 25g
D2456	Diethyl 2,5-Dioxahexanedioate	>98.0%(GC)	25g
E0076	Ethylene Carbonate	>99.0%(GC)	25g / 500g
F0731	4-Fluoro-1,3-dioxolan-2-one	>98.0%(GC)	5g / 25g
G0279	Glycerol 1,2-Carbonate	>90.0%(GC)	25g / 100g
H1447	4-(Hydroxymethyl)-5-methyl-1,3-dioxol-2-one	>93.0%(GC)	1g / 5g
M3376	Methyl 2,2,2-Trifluoroethyl Carbonate	>98.0%(GC)	5g / 25g
P0525	Propylene Carbonate	>98.0%(GC)	25g / 500g
T3985	4-(Trifluoromethyl)-1,3-dioxolan-2-one	>95.0%(GC)	1g / 5g

V0015	Vinylene Carbonate (stabilized with BHT)	>98.0%(GC)	5g / 25g
V0114	4-Vinyl-1,3-dioxolan-2-one	>98.0%(GC)	25g / 100g

Nitriles

C0450	Ethylene Cyanohydrin	>97.0%(GC)	25ml
E0108	Ethylene Glycol Bis(propionitrile) Ether	>97.0%(GC)	25g / 100g
E0299	3-Ethoxypropionitrile	>99.0%(GC)	25ml / 500ml
M0103	Methoxyacetoneitrile	>98.0%(GC)	5ml / 25ml
M0653	3-Methoxypropionitrile	>99.0%(GC)	25ml / 500ml

Sulfonyls and Related Compounds

B0136	1,4-Butanesultone	>99.0%(GC)	25g / 250g
D0264	Dimethyl Sulfit	>99.0%(GC)	25g / 500g
D1171	Dipropyl Sulfone	>99.0%(GC)	25g
D2830	1,3,2-Dioxathiolane 2,2-Dioxide	>98.0%(GC)	5g / 25g
D2977	1,3,2-Dioxathiolane 2-Oxide	>98.0%(GC)	5g / 25g
D6135	1,1,1-Trifluoro-N,N-dimethylmethanesulfonamide	>98.0%(GC)	1g / 5g
I0484	Isopropyl Methyl Sulfone	>97.0%(GC)	5g / 25g
M0436	3-Methylsulfolane	>98.0%(GC)	25g / 250g
M1239	Dimethyl Sulfone	>99.0%(GC)	25g / 500g
M2471	4-Methyl-1,3,2-dioxathiolane 2-Oxide (mixture of isomers)	>98.0%(GC)	5g / 25g
M3380	3-Methoxytetrahydrothiophene 1,1-Dioxide = MESL	>99.0%(GC)	5g / 25g
P0324	1,3-Propanesultone	>99.0%(GC)	25g / 100g / 500g
T0115	Tetrahydrothiophene 1,1-Dioxide	>99.0%(GC)	25g / 500g

For Secondary Battery Anode Use, Carbon Coated SiO/Mg Composite Material

C3864	Carbon Coated Silicon Monooxide/Magnesium Composite Material		25g / 100g
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Air-Stable Antiaromatic Nickel(II) Norcorrole Complex

N1236	Ni(II) meso-Dimesitylnorcorrole		50mg / 200mg
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memo

memo

Handwriting practice lines consisting of 28 horizontal dashed lines.



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