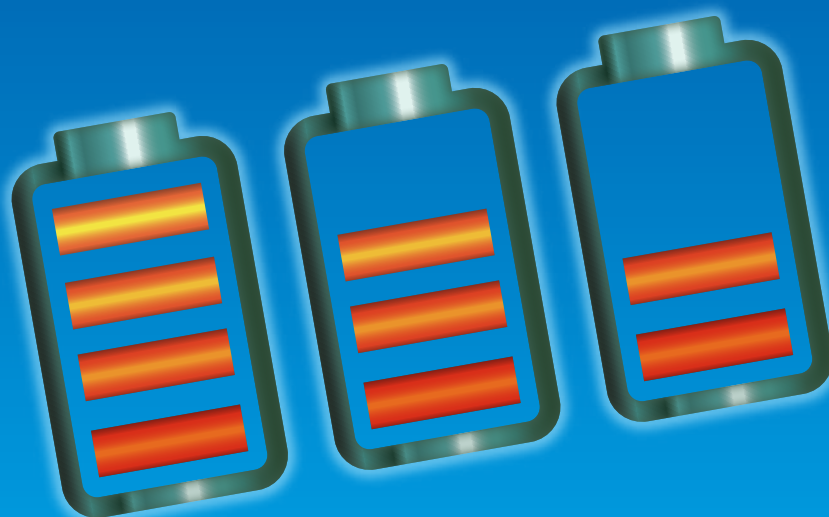


蓄電池研究用試薬

Battery Research Reagents



LiB
RFB

電池電解質

電極材料

有機溶媒

電池添加剤

有機レドックスフロー電池材料

蓄電池研究用試薬

二次電池は充電により繰り返し使用可能な電池で、ニッケル-カドミウムやニッケル水素、リチウムイオン電池等の小型電池や、鉛蓄電池等の大型電池が知られています。二次電池は自動車や航空機、農業機械や電気自動車の他、パソコンや携帯電話等のモバイル機器をはじめとする様々な用途で使用されています。最近主流になっている二次電池はリチウムイオン電池で、正極材にコバルト酸リチウム、負極材には黒鉛、電解液には有機物の液体が用いられます¹⁾。コバルト酸リチウムの中に含まれるリチウムのイオン伝導により放充電され、そのため高い電圧とエネルギー密度が得られます。また、メモリー効果が発生せず、パッケージのコンパクト化が可能などの優れた点を有しています。しかしながら、さらなる低炭素社会の構築やエネルギーセキュリティの面から、より良い二次電池の開発が現在も行われています。

有機系電解液は基本的に引火点を持つことより、リチウムイオン電池の本質的な安全性向上のためには、イオン液体電解質²⁾、亜リン酸エステル³⁾、有機固体電解質、無機固体電解質などの開発が望まれています。また、電解液への添加剤として、フッ素系難燃剤⁴⁾の開発も検討されています。電解質は二次電池の入出力特性、寿命、安全性、電圧に直接関わる重要な材料です。広い温度範囲で高いリチウムイオン伝導性を示し、電気的・化学的安定性が高く、人体や環境への負荷が低いことも望まれます。

現行のリチウムイオン電池に代替可能な次世代二次電池として、高エネルギー密度を有する電池の開発が活発に行われています。中でも多電子移動が可能な負極を用いた、多価イオンをキャリアとする二次電池の実用化が期待されています。例えば、マグネシウム二次電池は高い理論容量密度を持ち、資源量が豊富かつ安全性が高いという利点から、リチウムイオン電池を凌駕する二次電池として期待されています⁵⁾。

レドックスフロー電池 (RFB) は、大規模化可能な設置型蓄電池として応用研究が進んでおり、これらは電力の需要・供給のバランスが取れたスマートグリッドに必要な蓄電装置として期待されています。レドックス活性な有機材料を電解液に用いることで、先行研究がおこなわれているバナジウムRFBよりも低コストに製造が可能になることから、有機RFBは近年注目を集めています⁶⁻⁸⁾。

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電池電解質

リチウム
電解質

L0204 25g 300g

Lithium Chloride
Anhydrous
CAS RN: 7447-41-8

L0210 25g 100g 500g

Lithium Bromide
CAS RN: 7550-35-8

L0133 25g

Lithium Tetrafluoroborate
CAS RN: 14283-07-9

L0146 25g 100g

Lithium Hexafluorophosphate
CAS RN: 21324-40-3

L0411 5g 25g

Lithium Hexafluoroantimonate
CAS RN: 18424-17-4

L0371 100g 500g

Lithium Sulfate
CAS RN: 10377-48-7

L0379 25g 100g 500g

Lithium Perchlorate
CAS RN: 7791-03-9

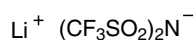
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Lithium Metaphosphate
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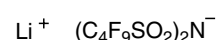
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LiFSI
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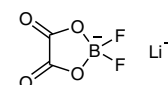
B2542 25g 250g

LiTFSI
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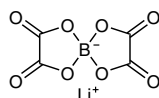
L0307 1g 5g

Lithium Bis(nonafluoro-
butanesulfonyl)imide
CAS RN: 119229-99-1

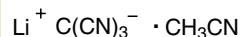
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Lithium Difluoro(oxalato)-
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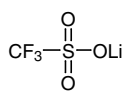
L0367 5g 25g

Lithium Bis(oxalato)borate
CAS RN: 244761-29-3

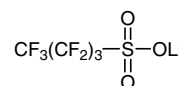
L0308 1g 5g

Lithium Tricyanomethanide -
Acetonitrile Complex

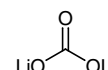
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Lithium Triflate
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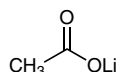
N0710 25g

Lithium Perfluoro-
1-butesulfonate
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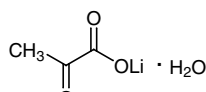
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Lithium Carbonate
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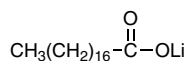
L0191 25g 500g

Lithium Acetate
CAS RN: 546-89-4

P0659 25g

Pyruvic Acid Lithium Salt
Monohydrate
CAS RN: 2922-61-4

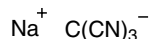
S0237 25g 500g

Lithium Stearate
CAS RN: 4485-12-5ナトリウム
電解質

O0494 25g 500g

Sodium Tetrafluoroborate
CAS RN: 13755-29-8

O0489 5g 25g

Sodium Tricyanomethanide
CAS RN: 36603-80-2

S0392 25g

Sodium Hexafluorophosphate
CAS RN: 21324-39-0カリウム
電解質

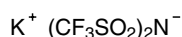
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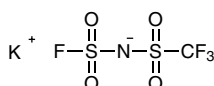
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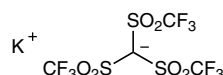
B2543 5g 25g

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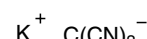
P2410 1g 5g

Potassium (Fluorosulfonyl)-
(trifluoromethanesulfonyl)-
imide
CAS RN: 860653-59-4

P2520 1g 5g

Potassium Tris(trifluoro-
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CAS RN: 114395-69-6

P2538 1g 5g

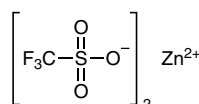
Potassium Tricyanomethanide
CAS RN: 34171-69-2

亜鉛電解質

Z0053 5g 25g

Zinc Chloride (High Purity &
Low water content)
CAS RN: 7646-85-7

Z0057 5g 25g





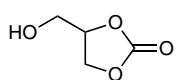
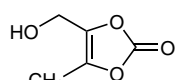
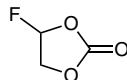
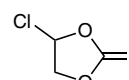
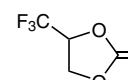
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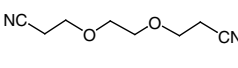
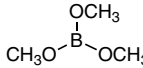
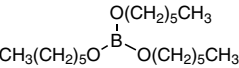
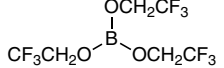
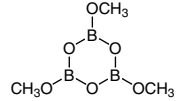
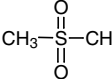
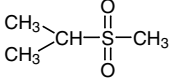
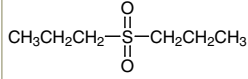
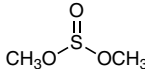
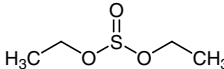

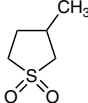



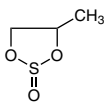

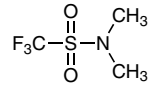
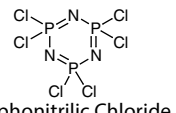
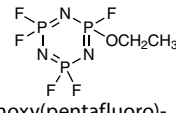
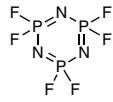
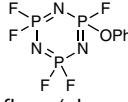
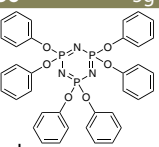
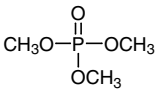
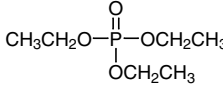
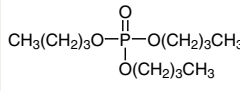
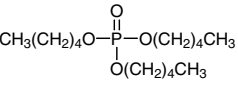
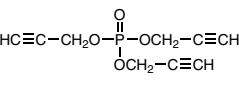
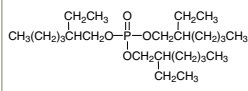
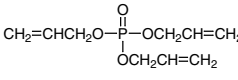
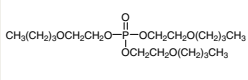
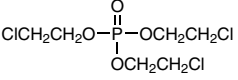
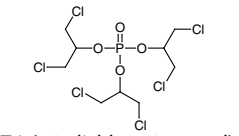
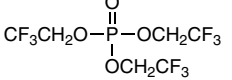
電極材料

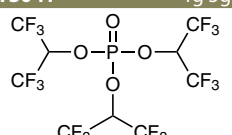
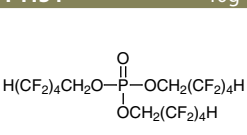
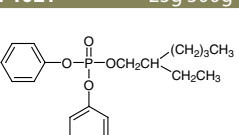
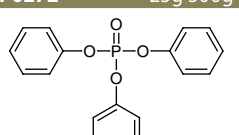
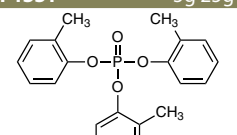
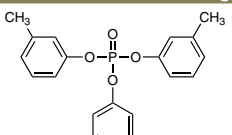
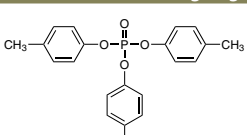
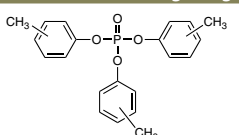

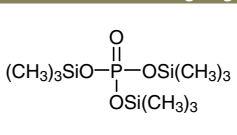
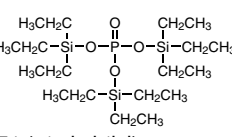
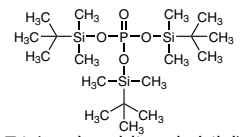
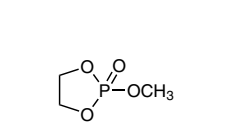
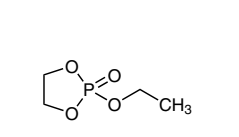
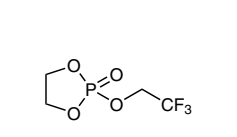
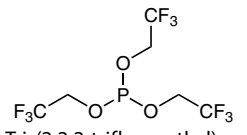
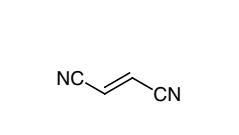
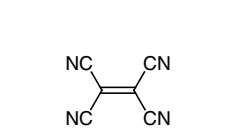
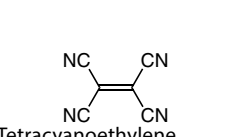
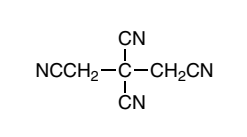
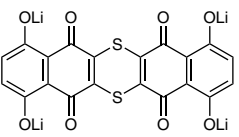
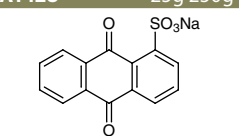
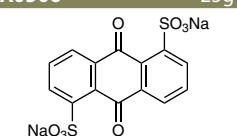
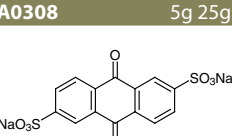
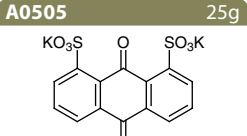
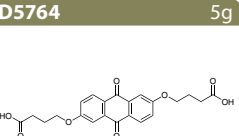
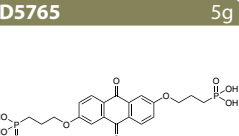
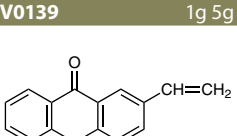
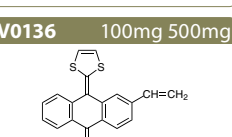
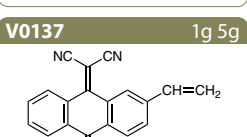
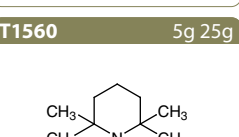
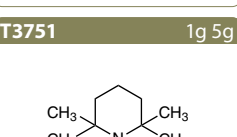
電極材料					L0384 25g 100g	L0407 5g 25g	L0390 5g 25g
					LiCoO_2 Lithium Cobalt(III) Oxide CAS RN: 12190-79-3	LiCoPO_4 Lithium Cobalt(II) Phosphate CAS RN: 13824-63-0	LiMnPO_4 Lithium Manganese(II) Phosphate, Carbon-coated CAS RN: 13826-59-0
L0389 25g 100g	L0380 25g 100g	L0386 25g 100g	L0402 5g 25g	L0417 5g 25g			
LiMn_2O_4 LMO CAS RN: 12057-17-9	$\text{Li}_4\text{Ti}_5\text{O}_{12}$ Lithium Titanate (Spinel) CAS RN: 12031-95-7	LiFePO_4 Lithium Iron(II) Phosphate, Carbon-coated CAS RN: 15365-14-7	LiNiPO_4 Lithium Nickel(II) Phosphate CAS RN: 13977-83-8	$\text{Li}_3\text{V}_2(\text{PO}_4)_3$ Lithium Vanadium Phosphate CAS RN: 84159-18-2			
L0391 25g 100g	L0415 5g 25g						
$\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ LMNO CAS RN: 12031-75-3	$\text{LiNi}_{0.8}\text{Co}_{0.2}\text{O}_2$ LNCO CAS RN: 113066-89-0						

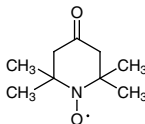
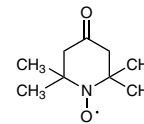
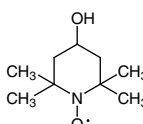
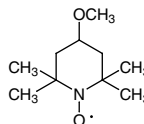
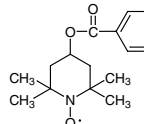
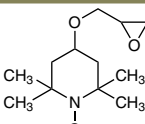
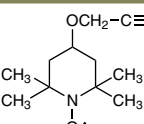
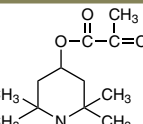
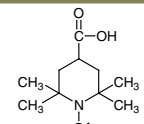
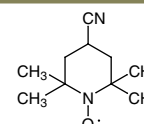
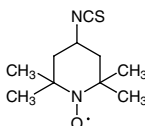
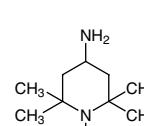
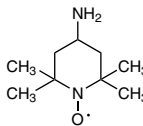
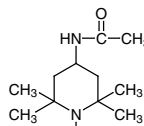
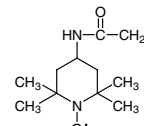
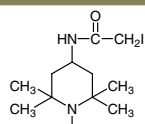
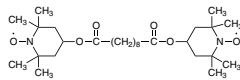
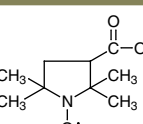
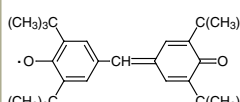
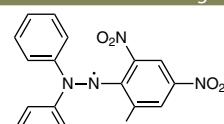
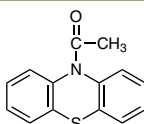
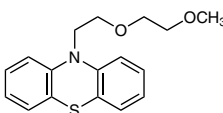
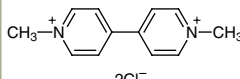
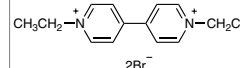
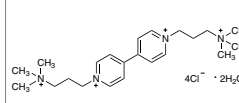
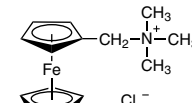
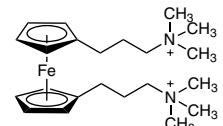
有機溶媒

炭酸
エステル

有機溶媒					C0053 25mL 100mL 500mL	C1342 10mL 25mL		
					$\text{CH}_3\text{O}-\text{C}(=\text{O})-\text{OCH}_3$ Dimethyl Carbonate CAS RN: 616-38-6	$\text{CH}_3-\text{CH}_2-\text{O}-\text{C}(=\text{O})-\text{OCH}_3$ Ethyl Methyl Carbonate CAS RN: 623-53-0		
C0041 25g 500g	C0040 5g 25g	M3376 5g 25g	B4703 5g 25g	D2455 5g 25g				
$\text{CH}_3-\text{CH}_2-\text{O}-\text{C}(=\text{O})-\text{O}-\text{CH}_2-\text{CH}_3$ Diethyl Carbonate CAS RN: 105-58-8	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{O}-\text{C}(=\text{O})-\text{O}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$ Dibutyl Carbonate CAS RN: 542-52-9	$\text{F}_3\text{C}-\text{CH}_2-\text{O}-\text{C}(=\text{O})-\text{OCH}_3$ Methyl 2,2,2-Trifluoroethyl Carbonate CAS RN: 156783-95-8	$\text{CF}_3-\text{CH}_2-\text{O}-\text{C}(=\text{O})-\text{O}-\text{CH}_2-\text{CF}_3$ Bis(2,2,2-trifluoroethyl) Carbonate CAS RN: 1513-87-7	$\text{CH}_3\text{O}-\text{C}(=\text{O})-\text{O}-\text{CH}_2-\text{CH}_2-\text{O}-\text{C}(=\text{O})-\text{OCH}_3$ Dimethyl 2,5-Dioxahexanedioate CAS RN: 88754-66-9				
D2456 25g	V0015 5g 25g	E0076 25g 500g	P0525 25g 500g	V0114 25g 100g				
$\text{CH}_3-\text{CH}_2-\text{O}-\text{C}(=\text{O})-\text{O}-\text{CH}_2-\text{CH}_2-\text{O}-\text{C}(=\text{O})-\text{O}-\text{CH}_2-\text{CH}_3$ Diethyl 2,5-Dioxahexanedioate CAS RN: 35466-87-6	 Vinylene Carbonate (stabilized with BHT) CAS RN: 872-36-6	 Ethylene Carbonate CAS RN: 96-49-1	 Propylene Carbonate CAS RN: 108-32-7	 Vinylethylene Carbonate CAS RN: 4427-96-7				
G0279 25g	H1447 1g 5g	F0731 5g 25g	C1858 5g 25g	T3985 1g 5g				
 Glycerol 1,2-Carbonate CAS RN: 931-40-8	 4-(Hydroxymethyl)-5-methyl-1,3-dioxol-2-one CAS RN: 91526-18-0	 Fluoroethylene Carbonate CAS RN: 114435-02-8	 Chloroethylene Carbonate CAS RN: 3967-54-2	 4-(Trifluoromethyl)-1,3-dioxolan-2-one CAS RN: 167951-80-6				
ニトリル					M0103 5mL 25mL	C0450 25mL	M0653 25mL 500mL	E0299 25mL 500mL
					$\text{CH}_3\text{O}-\text{CH}_2-\text{CN}$ Methoxyacetonitrile CAS RN: 1738-36-9	$\text{HO}-\text{CH}_2-\text{CH}_2-\text{CN}$ Ethylene Cyanohydrin CAS RN: 109-78-4	$\text{CH}_3\text{O}-\text{CH}_2-\text{CH}_2-\text{CN}$ 3-Methoxypropionitrile CAS RN: 110-67-8	$\text{CH}_3-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_2-\text{CN}$ 3-Ethoxypropionitrile CAS RN: 2141-62-0

E0108 25g 100g  1,2-Bis(2-cyanoethoxy)-ethane CAS RN: 3386-87-6	ホウ酸 エステル	B0522 25mL 100mL 500mL  Trimethyl Borate CAS RN: 121-43-7	B2094 5g 25g  Trihexyl Borate CAS RN: 5337-36-0	T3010 1g  Tris(2,2,2-trifluoroethyl) Borate CAS RN: 659-18-7	
T1581 25g 100g  2,4,6-Trimethoxyboroxin CAS RN: 102-24-9	スルホニル 関連化合物	M1239 25g 500g  Dimethyl Sulfone CAS RN: 67-71-0	I0484 5g 25g  Isopropyl Methyl Sulfone CAS RN: 4853-74-1	D1171 25g  Dipropyl Sulfone CAS RN: 598-03-8	
D0264 25g 500g  Dimethyl Sulfite CAS RN: 616-42-2	D0528 25g 500g  Diethyl Sulfite CAS RN: 623-81-4	T0115 25g 500g  Sulfolane CAS RN: 126-33-0	M0436 25g 250g  3-Methylsulfolane CAS RN: 872-93-5	P0324 25g 100g 500g  1,3-Propanesultone CAS RN: 1120-71-4	
B0136 25g 250g  1,4-Butanesultone CAS RN: 1633-83-6	D2977 5g 25g  Ethylene Sulfite CAS RN: 3741-38-6	M2471 5g 25g  1,2-Propylene Sulfite (mixture of isomers) CAS RN: 1469-73-4	D2830 5g 25g  Ethylene Sulfate CAS RN: 1072-53-3	D6135 1g 5g 25g  1,1,1-Trifluoro-N,N-dimethylmethanesulfonamide CAS RN: 28048-17-1	
電池添加剤		ホスファゼン		C0584 25g 250g  Phosphonitric Chloride Trimer CAS RN: 940-71-6	E1140 1g 5g  Ethoxy(pentafluoro)cyclotriphosphazene CAS RN: 33027-66-6
H1429 5g 25g  Hexafluoro-cyclotriphosphazene CAS RN: 15599-91-4	P2286 1g 5g  Pentafluoro(phenoxy)-cyclotriphosphazene CAS RN: 33027-68-8	H1356 5g 25g  Hexaphenoxy-cyclotriphosphazene CAS RN: 1184-10-7	リン酸 エステル		P0271 25g 500g  Trimethyl Phosphate CAS RN: 512-56-1
P0270 25g 500g  Triethyl Phosphate CAS RN: 78-40-0	P0266 25g 500g  Tributyl Phosphate CAS RN: 126-73-8	P0265 5mL 25mL  Triamyl Phosphate CAS RN: 2528-38-3	T3987 5g 25g  Tripropargyl Phosphate CAS RN: 1779-34-6	P1022 25mL 500mL  Trioctyl Phosphate CAS RN: 78-42-2	
P0264 25mL 100mL  Triallyl Phosphate CAS RN: 1623-19-4	P0683 25g 500g  Tris(2-butoxyethyl) Phosphate CAS RN: 78-51-3	T3447 25g 100g  Tris(2-chloroethyl) Phosphate CAS RN: 115-96-8	P0269 25g 500g  Tris(1,3-dichloro-2-propyl) Phosphate CAS RN: 13674-87-8	T3203 5g 25g  Tris(2,2,2-trifluoroethyl) Phosphate CAS RN: 358-63-4	

<p>T3041 1g 5g</p>  <p>Tris(1,1,1,3,3,3-hexafluoro-2-propyl) Phosphate CAS RN: 66489-68-7</p>	<p>P1134 10g</p>  <p>Tris(1H,1H,5H-octadecyl) Phosphate CAS RN: 355-86-2</p>	<p>P1021 25g 500g</p>  <p>Octyl Diphenyl Phosphate CAS RN: 1241-94-7</p>	<p>P0272 25g 500g</p>  <p>Triphenyl Phosphate CAS RN: 115-86-6</p>	<p>P1331 5g 25g</p>  <p>Tri-o-cresyl Phosphate CAS RN: 78-30-8</p>
<p>P1472 5g</p>  <p>Tri-m-cresyl Phosphate CAS RN: 563-04-2</p>	<p>T2209 5g 25g</p>  <p>Tri-p-cresyl Phosphate CAS RN: 78-32-0</p>	<p>P0273 25g 500g</p>  <p>Tricresyl Phosphate (mixture of isomers) CAS RN: 1330-78-5</p>	<p>P0259 25mL 500mL</p>  <p>Cresyl Diphenyl Phosphate (mixture of analogue) CAS RN: 26444-49-5</p>	<p>P1248 5g 25g</p>  <p>Tris(trimethylsilyl) Phosphate CAS RN: 10497-05-9</p>
<p>T4111 5g</p>  <p>Tris(triethylsilyl) Phosphate CAS RN: 123237-62-7</p>	<p>T4119 5g</p>  <p>Tris(tert-butyl)dimethylsilyl Phosphate CAS RN: 85197-28-0</p>	<p>M3604 1g 5g</p>  <p>Methyl Ethylene Phosphate CAS RN: 2196-04-5</p>	<p>E1458 1g 5g</p>  <p>Ethyl Ethylene Phosphate CAS RN: 823-31-4</p>	<p>E1456 1g 5g</p>  <p>TFEP CAS RN: 67605-68-9</p>
<p>亜リン酸エステル</p>	<p>T3991 5g 25g</p>  <p>Tris(2,2,2-trifluoroethyl) Phosphite CAS RN: 370-69-4</p>	<p>ニトリル</p>	<p>F0072 5g 25g</p>  <p>Fumaronitrile CAS RN: 764-42-1</p>	<p>T0077 5g 25g</p>  <p>Tetracyanoethylene CAS RN: 670-54-2</p>
<p>T3264 1g 5g</p>  <p>Tetracyanoethylene (purified by sublimation) CAS RN: 670-54-2</p>	<p>P1751 1g 5g</p>  <p>1,2,2,3-Tetracyanopropane CAS RN: 1274904-48-1</p>	<p>電池正極活物質</p>	<p>D5947 100mg 500mg</p>  <p>DNP-Li CAS RN: 1882849-59-3</p>	
<p>有機レドックスフロー電池材料</p>		<p>キノン・類縁体</p>	<p>A1428 25g 250g</p>  <p>Sodium Anthraquinone-1-sulfonate CAS RN: 128-56-3</p>	<p>A0506 25g</p>  <p>Anthraquinone-1,5-disulfonic Acid Disodium Salt CAS RN: 853-35-0</p>
<p>A0308 5g 25g</p>  <p>Disodium Anthraquinone-2,6-disulfonate CAS RN: 853-68-9</p>	<p>A0505 25g</p>  <p>Dipotassium Anthraquinone-1,8-disulfonate CAS RN: 14938-42-2</p>	<p>D5764 5g</p>  <p>2,6-DBEAQ CAS RN: 2370885-20-2</p>	<p>D5765 5g</p>  <p>2,6-DPPEAQ CAS RN: 2370885-23-5</p>	<p>V0139 1g 5g</p>  <p>2-Vinylanthraquinone CAS RN: 13388-33-5</p>
<p>V0136 100mg 500mg</p>  <p>9,10-Bis(1,3-dithiol-2-ylidene)-2-vinylanthracene CAS RN: 736998-56-4</p>	<p>V0137 1g 5g</p>  <p>9,10-Bis(dicyanomethylene)-2-vinylanthracene CAS RN: 1612793-07-3</p>	<p>有機ラジカル</p>	<p>T1560 5g 25g</p>  <p>TEMPO Free Radical CAS RN: 2564-83-2</p>	<p>T3751 1g 5g</p>  <p>TEMPO Free Radical (purified by sublimation) CAS RN: 2564-83-2</p>

O0266 5g 25g  4-Oxo-TEMPO Free Radical CAS RN: 2896-70-0	O0521 1g  4-Oxo-TEMPO Free Radical (purified by sublimation) CAS RN: 2896-70-0	H0865 5g 25g  TEMPOL Free Radical CAS RN: 2226-96-2	M1197 1g 5g  4-Methoxy-TEMPO Free Radical CAS RN: 95407-69-5	H0878 1g 5g  4-Hydroxy-TEMPO Benzoate Free Radical CAS RN: 3225-26-1
G0555 1g 5g  4-Glycidyloxy-TEMPO Free Radical CAS RN: 122413-85-8	T3169 1g 5g  4-(2-Propynyloxy)-TEMPO Free Radical CAS RN: 147045-24-7	M1531 1g 5g  TEMPO Methacrylate CAS RN: 15051-46-4	C1428 100mg 1g  4-Carboxy-TEMPO Free Radical CAS RN: 37149-18-1	C1782 1g  4-Cyano-TEMPO Free Radical CAS RN: 38078-71-6
I0486 100mg  4-Isothiocyanato-TEMPO Free Radical CAS RN: 36410-81-8	A1343 1g 5g  4-Amino-TEMPO Free Radical CAS RN: 14691-88-4	A3235 200mg 1g  4-Amino-TEMPO Free Radical (purified by sublimation) CAS RN: 14691-88-4	A1348 5g 25g  4-Acetamido-TEMPO Free Radical CAS RN: 14691-89-5	C1432 100mg 1g  4-(2-Chloroacetamido)-TEMPO Free Radical CAS RN: 36775-23-2
I0487 100mg  4-(2-Iodoacetamido)-TEMPO Free Radical CAS RN: 25713-24-0	B5642 1g 5g  Bis(2,2,6,6-tetramethyl-4-piperidyl-1-oxyl) Sebacate CAS RN: 2516-92-9	C1406 1g  3-Carboxy-PROXYL Free Radical CAS RN: 2154-68-9	G0020 1g 5g  Galvinoxyl Free Radical CAS RN: 2370-18-5	D4313 1g 5g  DPPH Free Radical CAS RN: 1898-66-4
その他の有機活物質	A3154 1g 5g  10-Acetylphenothiazine CAS RN: 1628-29-1	M3068 10g  MEEPT CAS RN: 2098786-35-5	D3685 1g 5g  Methyl Viologen CAS RN: 1910-42-5	E1430 1g 5g  Ethylviologen Dibromide CAS RN: 53721-12-3
B5659 5g  BTMAP-Vi Dihydrate CAS RN: 108228-37-1	F1231 1g 5g  FcNCl CAS RN: 83617-79-2	B5660 5g  BTMAP-Fc CAS RN: 2093414-16-3		

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