Reagents for battery research

Kanto Chemical Co., Inc.

Reagent for battery research

Kanto Chemical have a range of electrolyte and dehydrated solvents that can be used as battery research. The field of battery research, including lithium-ion batteries, sodium-ion batteries and potassium-ion batteries, is attracting increasing attention as an important area for achieving carbon neutrality.

In addition to lithium-ion batteries using flame-retardant ionic liquids and solid electrolytes, research and development is also being conducted on sodium-ion batteries and potassium-ion batteries as candidates for new secondary batteries to replace lithium-ion batteries.

Kanto Chemical offer a full range of peripheral reagents to meet the needs of our customers. We also handle mixed solvents, so please contact your local sales office for further information.

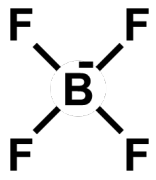
Electrolytes

The electrolyte acts as a source of metal ion(M^+), which are essential for charging and discharging the battery.

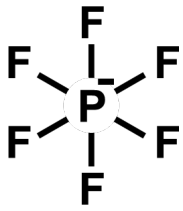
(Lithium ion batteries: Li^+, sodium ion batteries: Na^+, potassium ion batteries :K^+)

Typical anion species

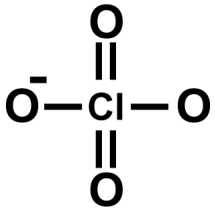
The structural formulae of commonly used electrolytes are given below.



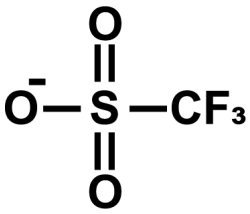
Tetrafluoroborate salts



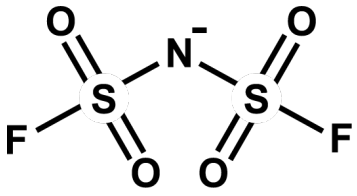
Hexafluorophosphate salts



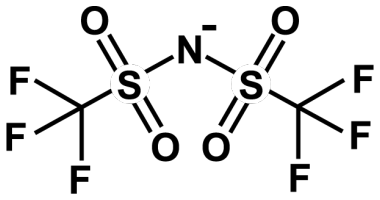
Perchlorate salts



Trifluoromethanesulfonic acid salts



Bis(fluorosulfonyl)imide salts



Bis(trifluoromethanesulfonyl)imide salts

As for the lithium salts on the next page, in addition to low moisture values, they are offered with standard guarantees for metals and other substances.

In addition, the glass containers are filled with argon gas and packaged in lami-zip (argon-filled) with desiccant as outer packaging. (After use, the container and the lami-zip should be replaced with inert gas to avoid air contamination.)

Please use the product not only as a reagent for battery research, but also in a wide range of applications from precursors for ionic liquids to applications where high purity is required

Item List – Electrolyte -

◆Lithium salts – Li –

Name	Formula	Grade	CAS No.	Package	Product No.
Lithium hexafluorophosphate	$LiPF_6$	for advanced material research	21324-40-3	25 g	24077-35
				100 g	24077-25
Lithium tetrafluoroborate	$LiBF_4$	for advanced material research	14283-07-9	25 g	24078-35
				100 g	24078-25
Lithium perchlorate, anhydrous	$LiClO_4$	for advanced material research	7791-03-9	25 g	24136-35
				100 g	24136-25
Lithium bis(fluorosulfonyl)imide	LiFSI LiFSA	for advanced material research	171611-11-3	5 g	24076-55
				25 g	24076-35

Example of Spec. – Electrolytes –

◆Lithium hexafluorophosphate [$LiPF_6$]

Item	Unit	Specification
Purity	%	min. 99.5
Water	%	max. 0.005
Chloride (Cl)	%	max. 0.003
Bromide(Br)	%	max. 0.003
Nitrate (NO_3)	%	max. 0.003
Phosphate (PO_4)	%	max. 0.003
Sulfate (SO_4)	%	max. 0.003
Barium (Ba)	%	max. 0.001
Calcium (Ca)	%	max. 0.001
Iron (Fe)	%	max. 0.001
Potassium (K)	%	max. 0.001
Magnesium (Mg)	%	max. 0.001
Sodium (Na)	%	max. 0.001
Lead (Pb)	%	max. 0.001

◆Lithium bis(fluorosulfonyl)imide [LiFSI]

Item	Unit	Specification
Purity	%	min. 99.5
Water	%	max. 0.02
Chloride (Cl)	%	max. 0.003
Bromide(Br)	%	max. 0.003
Nitrate (NO_3)	%	max. 0.003
Phosphate (PO_4)	%	max. 0.003
Sulfate (SO_4)	%	max. 0.003
Barium (Ba)	%	max. 0.001
Calcium (Ca)	%	max. 0.001
Iron (Fe)	%	max. 0.001
Potassium (K)	%	max. 0.001
Magnesium (Mg)	%	max. 0.001
Sodium (Na)	%	max. 0.001
Lead (Pb)	%	max. 0.001

Related Item List – Metal salts –

◆ Lithium salts - Li -

Name	Formula	Grade	CAS No.	Package	Product No.
Lithium bis(trifluoromethanesulfonyl)imide	LiTFSI LiTFSA	for advanced material research	90076-65-6	25 g	24290-35
				250 g	24290-15
				2 kg	24290-95
Lithium trifluoromethanesulfonate	LiOTf LiTFS	for advanced material research	33454-82-9	25 g	24042-35
				100 g	24042-25
Lithium nonafluorobutanesulfonate	LiNfO	for advanced material research	131651-65-5	25 g	24041-35

◆ Sodium salts - Na -

Name	Formula	Grade	CAS No.	Package	Product No.
Sodium tetrafluoroborate	$NaBF_4$	Extra pure	13755-29-8	500 g	37130-01
Sodium perchlorate, anhydrous	$NaClO_4$	Guaranteed reagent	7601-89-0	25 g	37232-30
				500 g	37232-00
Trifluoromethanesulfonic acid sodium salt	NaOTf	-	2926-30-9	25 g	40851-32

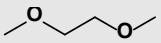
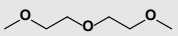
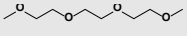
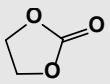
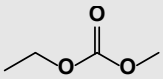
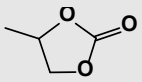
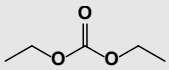
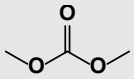
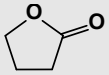
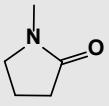
◆ Potassium salts - K -

Name	Formula	Grade	CAS No.	Package	Product No.
Potassium hexafluorophosphate	KPF_6	Organics	17084-13-8	25 g	32843-35
Potassium tetrafluoroborate	KBF_4	Extra pure	14075-53-7	500 g	32317-01
Potassium perchlorate	$KClO_4$	Guaranteed reagent	7778-74-7	25 g	32371-30
				500 g	32371-00
Potassium bis(trifluoromethanesulfonyl)imide	KTFSI KTFSA	for advanced material research	90076-67-8	25 g	33005-35
				250 g	33005-15
				2 kg	33005-95
Potassium trifluoromethanesulfonate	KOTf	for advanced material research	2926-27-4	25 g	33013-35
				100 g	33013-25
Potassium bis(nonafluorobutanesulfonyl)imide	$(C_4F_9SO_2)_2NK$	for advanced material research	129135-87-1	1 g	33008-65
				5 g	33008-55

Dehydrated solvent【for electrochemistry】

We have a range of dehydrated solvents that can be used as electrolytes and measuring solvents. Electrolytes react easily with water and products with guaranteed low moisture content are useful as reagents for battery research. We have a wide range of cyclic and chain carbonate solvents such as ethylene carbonate (EC) and ethyl methyl carbonate (EMC), as well as grime and nitrile solvents.

Item List

Name	Formula	CAS No.	Package	Product No.
Ethylene glycol dimethyl ether (Monoglyme) [DME]		110-71-4	100 mL	14121-23
			500 mL	14121-08
Diethylene glycol dimethyl ether (Diglyme) [DMDG]		111-96-6	100 mL	10232-23
			500 mL	10232-08
Triethylene glycol dimethyl ether (Triglyme) [DMTG]		112-49-2	100 mL	40276-23
			500 mL	40276-08
Ethylene carbonate [EC]		96-49-1	100 g	14086-25
			500 g	14086-05
Ethyl methylcarbonate [EMC]		623-53-0	100 mL	14741-23
			500 mL	14741-08
Propylene carbonate [PC]		108-32-7	100 mL	32455-23
			500 mL	32455-08
Diethyl carbonate [DEC]		105-58-8	100 mL	14075-23
			500 mL	14075-08
Dimethyl carbonate [DMC]		616-38-6	100 mL	10340-23
			500 mL	10340-08
Acetonitrile [ACN]	CH_3CN	75-05-8	100 mL	01030-23
			500 mL	01030-08
Propionitrile [EtCN]	CH_3CH_2CN	107-12-0	100 mL	32130-23
			500 mL	32130-08
4-Butyrolactone [γ-Butyrolactone]		96-48-0	100 mL	04512-23
			500 mL	04512-08
N-Methyl-2-pyrrolidinone [NMP]		872-50-4	100 mL	25336-23
			500 mL	25336-09

Related item – Dehydrated solvents -

Name	Grade	CAS No.	Package	Product No.
Ethyl acetate, dehydrated -Super-	Organics	141-78-6	100 mL	14060-25
			500 mL	14060-05
N,N-Dimethylformamide, dehydrated -Super-	Organics	68-12-2	100 mL	11339-25
			500 mL	11339-05
Dimethylsulfoxide, dehydrated -Super-	Organics	67-68-5	100 mL	10380-25
			500 mL	10380-05
Toluene, dehydrated -Super-	Organics	108-88-3	100 mL	40500-25
			500 mL	40500-05
NEW Anisole, dehydrated -Super-	Organics	100-66-3	500 mL	02016-08
NEW Mesitylene, dehydrated -Super-	Organics	108-67-8	500 mL	26192-08
NEW Monochlorobenzene, dehydrated -Super-	Organics	108-90-7	500 mL	26193-08
NEW Butyl acetate, dehydrated	Organics	123-86-4	500 mL	05863-08

Mixture Solvent【for electrochemistry】

The electrolyte used in lithium-ion batteries is generally a mixture of cyclic carbonates such as ethylene carbonate (EC) and chain carbonates such as dimethyl carbonate (DMC) and ethyl methyl carbonate (EMC). We offer a wide range of mixed solvent products. Please contact your local sales office for customized formulations and other requirements.

Name	Formula	Grade	Package	Product No.
Ethylene carbonate/Dimethyl carbonate=1:1(v/v%)	EC:DMC = 1:1(v/v%)	for electrochemistry	100 mL	14065-23
			500 mL	14065-08
Ethylene carbonate/Diethyl carbonate=1:1(v/v%)	EC:DEC = 1:1(v/v%)	for electrochemistry	100 mL	14066-23
			500 mL	14066-08
Ethylene carbonate/Ethyl methyl carbonate=1:1(v/v%)	EC:EMC = 1:1(v/v%)	for electrochemistry	100 mL	14067-23
			500 mL	14067-08
Ethylene carbonate/Ethylene glycol dimethyl ether=1:1(v/v%)	EC:DME = 1:1(v/v%)	for electrochemistry	100 mL	14068-23
			500 mL	14068-08

※Liquid products are packaged in a lami-zip (argon-filled) with a desiccant as an outer packaging.After use, the container and the lami-zip should be replaced with inert gas to avoid air contamination.

Example of Spec. – Dehydrated solvents -

Our dehydrated solvents for electrochemistry are provided with meticulous standards guarantees for moisture, metals, etc. The same strict standards are also set for mixed solvents, so that they can be used without any pre-treatment.

◆Ethylene carbonate [EC]

Item	Unit	Specification
Purity (GC)	%	min. 99.5
Water	%	max. 0.003
Fluoride (F)	ppm	max. 1
Chloride (Cl)	ppm	max. 5
Bromide (Br)	%	max. 0.003
Nitrate (NO_3)	%	max. 0.003
Phosphate (PO_4)	%	max. 0.005
Sulfate (SO_4)	%	max. 0.003
Calcium (Ca)	ppm	max. 1
Iron (Fe)	ppm	max. 1
Potassium (K)	ppm	max. 1
Sodium (Na)	ppm	max. 1

◆EC:DMC = 1:1(v/v%)

Item	Unit	Specification
Ethylene carbonate	vol%	48.0～52.0
Dimethyl carbonate	vol%	48.0～52.0
Water	%	max. 0.003
Fluoride (F)	ppm	max. 1
Chloride (Cl)	ppm	max. 5
Bromide (Br)	%	max. 0.003
Nitrate (NO_3)	%	max. 0.003
Phosphate (PO_4)	%	max. 0.005
Sulfate (SO_4)	%	max. 0.003
Sodium (Na)	ppm	max. 1
Potassium (K)	ppm	max. 1
Calcium (Ca)	ppm	max. 1
Iron (Fe)	ppm	max. 1

Package - Dehydrated solvents -

【Liquid Item】
・A special rubber & Teflon (polytetrafluoroethylene) sheet
・Each 100mL and 500mL package has a special cap through which a syringe needle can be inserted. The solvent is collected while blowing nitrogen gas into a package.

【Solid Items】
Solid products (ethylene carbonate) are packaged in glass containers filled with argon gas and lami-zipped (argon-filled) as outer packaging.
After use, the container and the lami-zip should be filled with inert gas to prevent air contamination.

- Please use the products listed in the catalog as reagents (chemicals used for testing or research purpose).
- Product information is subject to change without notice. For the latest information, please have a look at our website "Cica-Web".

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