



Chemicals

Powering success in energy storage and battery systems

Chemicals and materials for research, production, and analysis



Battery Applications:

A total workflow solution

The growth of battery research is driven by the increasing use of electric vehicles, energy storage systems (ESS), and portable electronics that require high energy-density lithium-ion batteries.

To improve battery performance, it has become necessary to develop new materials and parts that serve as traditional Lithium-based alternatives. This is also exacerbated by the volatile supply of Lithium as a commodity. Researchers are now racing to search for the answer to tomorrow's battery solutions, with key topics such as solid state and Group I metal alternatives as a key driving focus.

This is where our products at Thermo Fisher Scientific Laboratory Chemicals can help you. We understand that throughout the process from research to production, and finally, analysis, chemicals of varying grades, purities, and mixtures are required for success. With our extended range of chemicals in organics, inorganics, and analytical solvents, there will be something even for the most demanding of research tasks.

Our brands

thermo
scientific

Our Thermo Scientific chemicals portfolio is built on a foundation of our legacy brands including Acros Organics, Alfa Aesar, and Maybridge brands. Our portfolio includes over 80,000 chemicals and biochemical reagents, such such as ultra-pure organics, heterocyclic building blocks, solvents, coupling reagents, screening libraries for drug discovery, organometallics, ligands, metal catalysts, precious metal compounds, and performance materials for electronics and nanotechnology.

As of 2022, Acros Organics, Alfa Aesar, and Maybridge have completed the brand transition to Thermo Scientific. Learn more about these changes with regards to packaging and labeling at [alfa.com/en/brand-message](https://www.alfa.com/en/brand-message).

 **fisher**
chemical

Find exactly what you need from our portfolio of more than 800 high-purity solvents formulated to suit applications for LC/MS, HPLC, UHPLC/MS, gas chromatography, and spectrometry.

Our solvents are manufactured in ISO 9001 certified facilities and undergo rigorous quality assurance testing to bring you the lot-to-lot and bottle-to-bottle consistency you rely on. Since our beginning, we've supported the science community's research chemical needs. With years of experience and a team of highly knowledgeable and dedicated people, the Fisher Chemical brand delivers the highest levels of customer service, technical assistance, and fast, accurate delivery.



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Your journey with us at Thermo Fisher Scientific

Whether you are engaging in research for the next cation alternative with inorganics and ligands or finding new organic molecules to tap on their resonance abilities for ion transfer, or post-reaction analysis on samples, we have a complete line of solutions for your battery research workflow. Read below to find out on our capabilities and how our products can help bring you to battery success.



Our lab-to-line workflow

Formulation materials for anode and cathode research

Our Thermo Scientific™ line of inorganic product provide high-quality salts, complexes, and conjugated molecules such as fullerene. We also have an extensive range of pure metals such as Lithium and copper foil, Magnesium turnings, and more.

Formulation materials for electrolyte research

Our Thermo Scientific™ range of fine, organic chemical products offer a wide selection of carbonyl, aromatic, heterocyclic, and conjugated reagents that allow you to leverage on their resonance abilities. We also provide high-quality formulation inorganic salts like Lithium hexafluorophosphate and Lithium perchlorate. These product lines are also available in our Acroseal® packaging, ensuring that your reagents are protected against air and moisture for a longer shelf-life.

Production and bulk capabilities

Whether you're ready to take your research into production, or require chemicals in bulk volume as a laboratory need, our custom and bulk team will be here to help scale it up. Choose from a range of customizations from CoA requirements, pack-sizes, mixed blends, and more.

Standards and high-purity solvents for trace elemental analysis (TEA)

Our Thermo Scientific range of Specpure™ standards offer a comprehensive line of spectrochemical analytical standard solutions.

For trace elemental analysis, be it AAS, ICP-OES or ICP-MS, we take pride in our range of Fisher Chemical acids that are available at ppb or ppt levels, depending on the grade used.

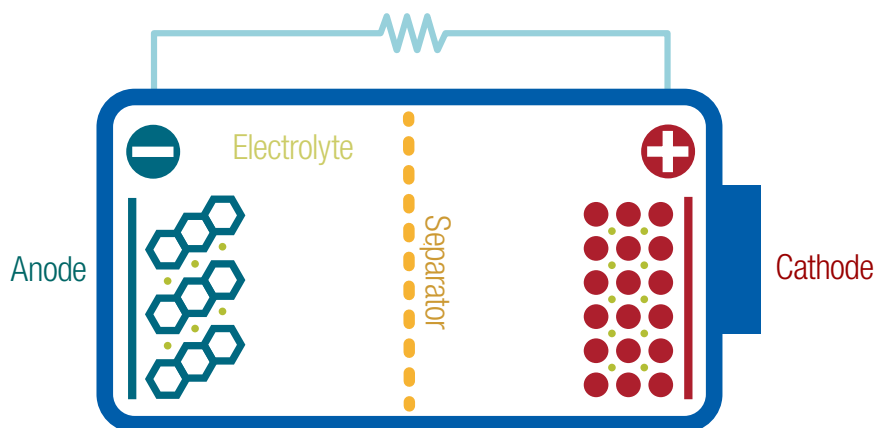
Analytical solvents for chromatography

Depending on the type of chromatography instrument you are using and the sensitivity requirements of your analytical needs, our Fisher Chemical solvents come in a range of purities and grades to ensure you are getting the desired outputs. Pick from a range of GC (Distol, Headspace), HPLC, LC/MS, Optima®, or UHPLC-MS grades.



Energy Cell Formulation Materials

A battery's core components consist of an anode, cathode, electrolyte, and separator. For areas in research pertaining to each of these core components, Thermo Fisher Scientific provides high-quality metals, metal-oxides, ligands, and other raw materials across various brands and categories to aid you in successful research.



Cathode formulation materials

The cathode is a source of ions which determines the capacity, as well as the average voltage of a battery. Thermo Scientific offers a wide portfolio of Lithium-based sources for the traditional research, as well as a variety of sodium-based salts for battery research.

Examples of inorganic materials used in battery research

CAS No.	Catalog No.	Product Description	Formula
7429-90-5	040682 040684	Aluminum Ultrathin foil, 0.0075 micron thick, 99.995% (metals basis) Aluminum Ultrathin foil, 1.0 micron thick, 99.995% (metals basis)	Al
12057-24-8	041832	Lithium oxide, 99.5% (metals basis)	Li ₂ O
1317-80-2	014631 044375	Titanium(IV) oxide, rutile, 99.99% (metals basis) Titanium(IV) oxide, rutile, 99.9% (metals basis)	TiO ₂
12190-79-3	042090	Lithium Cobalt (III) Oxide, 99.5% metals basis (LCO)	LiCoO ₂
12057-17-9	040250	Lithium Manganese (III, IV) oxide, 99.5% (metals basis)	LiMn ₂ O ₄
1310-66-3	H36379 044473	Lithium hydroxide monohydrate, battery grade Lithium hydroxide monohydrate, 99.995% (metals basis)	LiOH
554-13-2	010734	Lithium carbonate, Puratronic®, 99.998% (metals basis excluding Ca), Ca LT 20 ppm	Li ₂ CO ₃
7790-69-4	044456 010985	Lithium nitrate, anhydrous, 99.999% (metals basis) Lithium nitrate, anhydrous, 99.98% (metals basis)	LiNO ₃
1313-99-1	010819 044423	Nickel(II) oxide, Puratronic®, 99.998% (metals basis) Nickel(II) oxide, Puratronic®, 99.995% (metals basis)	NiO
1313-13-9	010805 044661 019347	Manganese(IV) oxide, Puratronic®, 99.996% (metals basis) Manganese(IV) oxide, 99.9% (metals basis) Manganese(IV) oxide, 99.99+%, (trace metal basis)	MnO ₂

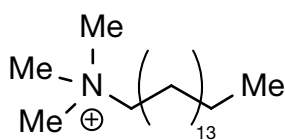


Cathode formulation materials continued

Examples of inorganic materials used in battery research continued

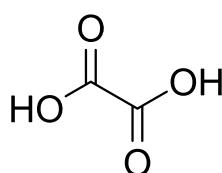
CAS No.	Catalog No.	Product Description	Formula
6156-78-1	010802	Manganese(II) acetate tetrahydrate, Puratronic®, 99.999% (metals basis)	Mn(CH ₃ COO) ₂ ·4H ₂ O
10034-96-5	A17615	Manganese(II) sulfate monohydrate, 99%	MnSO ₄ ·H ₂ O
6147-53-1	044345	Cobalt(II) acetate tetrahydrate, 99.999% (metals basis)	Co(CH ₃ COO) ₂ ·4H ₂ O
10026-24-1	010696	Cobalt(II) sulfate heptahydrate, Puratronic®, 99.999% (metals basis)	CoSO ₄ ·7H ₂ O
1308-06-1	040184	Cobalt(II,III) oxide, 99.7% (metals basis), 400 mesh (37 μm) powder	Co ₃ O ₄
	044661	Cobalt(II,III) oxide, nanopowder, 99% (metals basis)	
	045806	Cobalt(II,III) oxide, 99.7% (metals basis), 2 to 6 μm powder	
12057-17-9	040250	Lithium manganese(III,IV) oxide, 99.5% (metals basis)	LiMn ₂ O ₄
12136-58-2	012839	Lithium sulfide, 99.9% (metals basis)	Li ₂ S
6018-89-9	010813	Nickel(II) acetate tetrahydrate, Puratronic®, 99.999% (metals basis)	Ni(CH ₃ COO) ₂ ·4H ₂ O
10101-97-0	053130	Nickel(II) sulfate hexahydrate, 99.97% min (metals basis)	Ni ₂ SO ₄ ·6H ₂ O
10102-25-7	044352	Lithium sulfate, anhydrous, 99.99% (metals basis)	Li ₂ SO ₄
10377-52-3	010743	Lithium phosphate, Puratronic®, 99.99% (metals basis)	Li ₃ PO ₄
12030-49-8	043396	Iridium(IV) oxide, Premion r, 99.99% (metals basis), Ir 84.5% min	IrO ₂
14996-61-3	011030	Iridium(III) chloride hydrate, 99.8% (metals basis)	IrCl ₃
50926-11-9	041065	Indium tin oxide sputtering target, 50.8mm (2.0in) dia x 6.35mm (0.25in) thick, 99.99% (metals basis)	In _{2-x} Sn _x -O ₃
	044927	Indium tin oxide, NanoTek®, 99.5%	
	036348	Indium tin oxide, 99.99% (metals basis)	
	042677	Indium tin oxide, Vacuum Deposition Grade, 99.99% (metals basis)	

Examples of organic materials used in battery cathode research



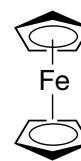
(1-Hexadecyl)trimethylammonium bromide (CTAB), 99+%, Thermo Scientific™

Cat. No: 022716
CAS No: 57-09-0



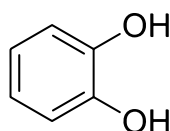
Oxalic acid dihydrate, 98%, Thermo Scientific™

Cat. No: A13866
CAS No: 6153-56-6



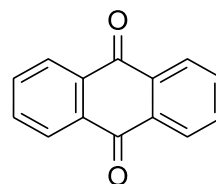
Ferrocene, high purity, 99+%, Thermo Scientific™

Cat. No: B25007
CAS No: 102-54-5



Catechol, 99+%, Thermo Scientific™

Cat. No: 015898
CAS No: 120-80-9



9,10-Anthraquinone, 98+%, Thermo Scientific™

Cat. No: A12735
CAS No: 84-65-1

Research

Production

Analysis



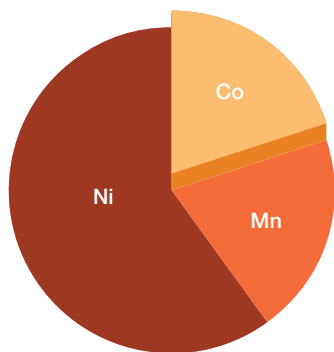
Contact us

Cathode formulation materials continued

Customized chemicals for cathode research:

Nickel - Cobalt - Manganese (NCM)

Choose from these available options in various ratio proportions and particle sizing.



NCM 622

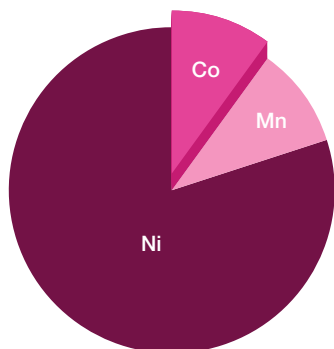
Product description

4-7 μm NCM 622 precursor

9-12 μm NCM 622 precursor

4-7 μm NCM 622 cathode material

10-15 μm NCM 622 cathode material



NCM 811

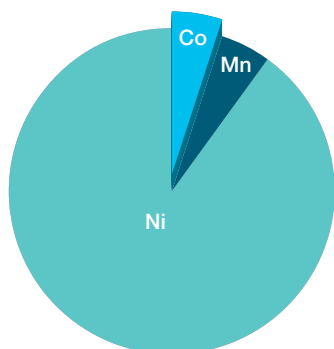
Product description

4-7 μm NCM 811 precursor

9-12 μm NCM 811 precursor

4-7 μm NCM 811 cathode material

10-15 μm NCM 811 cathode material



NCM 900505

Product description

4-7 μm NCM 900505 precursor

9-12 μm NCM 900505 precursor

4-7 μm NCM 900505 cathode material

10-15 μm NCM 900505 cathode material



Anode formulation materials

The anode is the negatively charged terminal of a battery or galvanic cell that releases electrons into the circuit. Much of today's research is centered around increasing the anode's capacity and thereby battery performance. The combination or single-use of various metals, inorganic complexes, and organic materials are being explored in various research fields. Ranging from inorganic compounds to organic materials exhibiting various behaviors (e.g. aromaticity, resonance, conjugation, etc.), Thermo Scientific has the products you need to fulfil your anode research workflows.

Examples of inorganic materials used in battery anode research

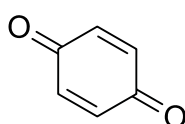
CAS No.	Catalog No.	Product Description	Formula
7440-50-8	010950 042972	Copper foil, 0.025mm (0.001in) thick, Puratronic®, 99.999% (metals basis) Copper foil, 0.05mm (0.002in) thick, Puratronic, 99.9999% (metals basis)	Cu (0)
7439-93-2	010767 017069	Lithium foil, 1.5mm (0.06in) thick x 100mm (3.9in) wide, 99.9% (metals basis) Lithium foil, 0.75mm (0.03in) thick x 19mm (0.75in) wide, 99.9% (metals basis)	Li (0)
7440-21-3	046308 044384	Silicon powder, crystalline, APS ≈ 100 nm, 99%, Plasma synthesized Silicon powder, crystalline, APS <50 nm, 98%, Laser synthesized from vapor phase	Si (0)
7782-42-5	040184 040797 014734	Graphite powder, synthetic, conducting grade, -325 mesh, 99.9995% (metals basis) Graphite powder, synthetic, conducting grade, -200 mesh, 99.9995% (metals basis) Graphite powder, natural, high purity, -200 mesh, 99.9998% (metals basis)	C
7782-42-5	010832 043078	Graphite foil, 0.254mm (0.01in) thick, 99.8% (metals basis) Graphite foil, 0.13mm (0.005in) thick, 99.8% (metals basis)	C
1333-86-4	H30253 039724 045527	Carbon black, Conductive, 99+% (metals basis) Carbon black, acetylene, 50% compressed, 99.9+% Carbon black, acetylene, 100% compressed, 99.9+%	C

Examples of organic materials used in battery anode research



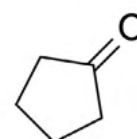
Fullerene, carbon nanotube, multi-walled, ≤8 nm OD, 2-5 nm ID, 0.5-2 micron long, Thermo Scientific™

Cat. No: 044790
CAS No: 308068-56-6



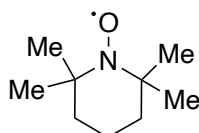
p-Benzoquinone, 98+%, Thermo Scientific™

Cat. No: A13162
CAS No: 106-51-4



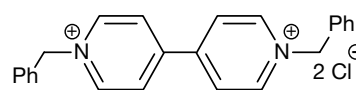
Cyclopentanone, 99+%, pure, Thermo Scientific™

Cat. No: 011153
CAS No: 120-92-3



TEMPO, free radical, 98+%, Thermo Scientific™

Cat. No: A12733
CAS No: 2564-83-2



Benzoyl viologen dichloride, 97%, Thermo Scientific™

Cat. No: H66836
CAS No: 1102-19-8

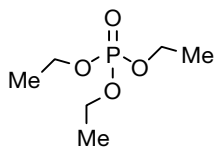


Electrolyte formulation materials

Transporting positively charged ions between the anode and cathode, the electrolyte is a key component of any battery cell. Our range of organic compounds from Thermo Scientific will be able to help you through your research requirements, particularly in these classes of compounds:

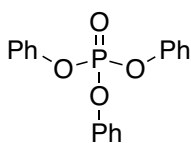
- 1. Conjugated Hydrocarbons:** These include various olefins, alkynes, and conjugated pi structures.
- 2. Heterocyclics:** Cyclic compounds which contain atoms from at least two different elements in the ring, and include nitrogen, oxygen, phosphorous, sulfur, and mixed heterocycles.
- 3. Aromatics:** Examples include benzene or pyridine and its derivatives.
- 4. Carbonyls:** Oxygen-containing compounds include aldehydes, ketones, esters, and carboxylic acids and its derivatives.

Examples of materials used in electrolyte research



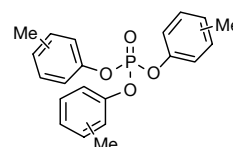
**Triethyl phosphate, 99+%,
Thermo Scientific™**

Cat. No: 040001
CAS No: 78-40-0



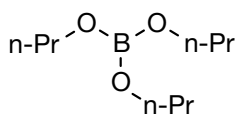
**Triphenyl phosphate, 99%,
Thermo Scientific™**

Cat. No: 014767
CAS No: 115-86-6



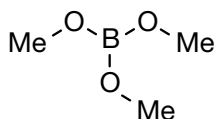
**Tritolyl phosphate, mixture of
isomers, ortho-isomers <1%
Thermo Scientific™**

Cat. No: A17433
CAS No: 1330-78-5



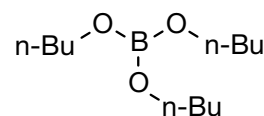
**Tri-n-propyl borate, 98%,
Thermo Scientific™**

Cat. No: 22974
CAS No: 688-71-1



**Trimethylborate, 99%,
Thermo Scientific™**

Cat. No: 014012
CAS No: 121-43-7



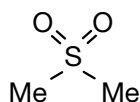
**Tri-n-butylborate, 98.0+%,
Thermo Scientific™**

Cat. No: A19322
CAS No: 688-74-4



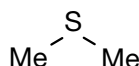
Electrolyte formulation materials continued

Examples of materials used in electrolyte research



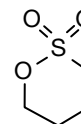
**Dimethyl sulfone, 99%,
Thermo Scientific™**

Cat. No: B21747
CAS No: 67-71-0



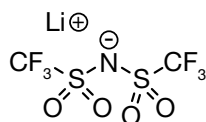
**Dimethyl sulfite, 99%,
Thermo Scientific™**

Cat. No: 14875
CAS No: 616-42-2



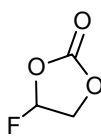
**1,4-Butanesultone, 99%
Thermo Scientific™**

Cat. No: 014012
CAS No: 121-43-7



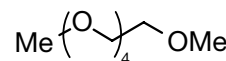
**Lithium
Bis(trifluoromethanesulfonyl)imide
(LiTFSI), 98+%, Thermo Scientific™**

Cat. No: H27307
CAS No: 90076-65-6



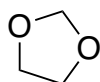
**4-Fluoro-1,3-dioxolan-2-one
98.0%, Thermo Scientific™**

Cat. No: H61502
CAS No: 114435-02-8



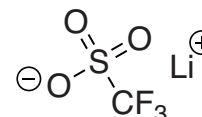
**Tetraethylene Glycol Dimethyl
Ether (TEGDME), 98+%,
Thermo Scientific™**

Cat. No: 020443
CAS No: 143-24-8



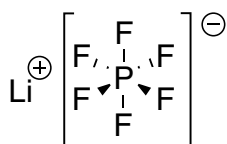
**1,3-Dioxolane, 99.5%, stab.
Thermo Scientific™**

Cat. No: 042897
CAS No: 646-06-0



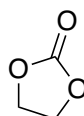
**Lithium trifluoromethanesulfonate,
98%, Thermo Scientific™**

Cat No: 35871
CAS No: 33454-82-9



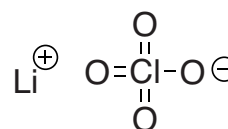
**Lithium hexafluorophosphate
(LiPF₆), 98%, Thermo Scientific™**

Cat. No: 011529
CAS No: 21324-40-3



**Ethylene carbonate, 99%,
Thermo Scientific™**

Cat. No: A15735
CAS No: 96-49-1



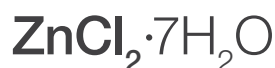
**Lithium perchlorate, anhydrous,
99.99% (metals basis),
Thermo Scientific™**

Cat. No: 044226
CAS No: 7791-03-9



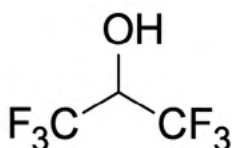
Electrolyte formulation materials continued

Examples of materials used in electrolyte research



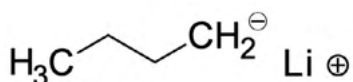
Zinc sulfate heptahydrate,
ACS, 99.0-103.0%,
Thermo Scientific™

Cat. No: 033399
CAS No: 7446-20-0



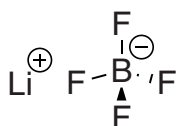
1,1,1,3,3,3-Hexafluoro-2-propanol,
99.5+%, pure, Thermo Scientific™

Cat. No: 015474
CAS No: 920-66-1



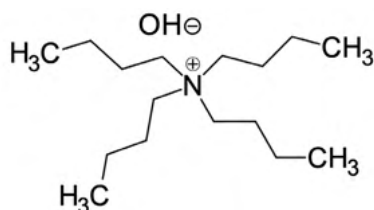
n-Butyllithium, 2.5M solution in
hexanes, AcroSeal,
Thermo Scientific™

Cat. No: 021335
CAS No: 109-72-8



Lithium tetrafluoroborate, 98%,
Thermo Scientific™

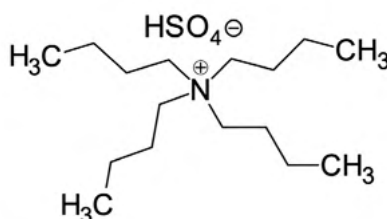
Cat. No: 011528
CAS No: 14283-07-9



Tetrabutylammonium hydroxide,
40 wt.% (1.5M) solution in water

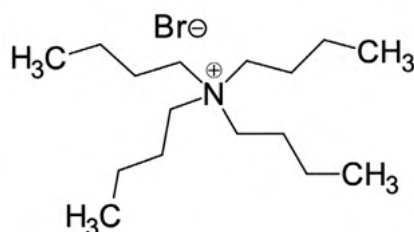
Thermo Scientific™

Cat. No: 017661
CAS No: 2052-49-5



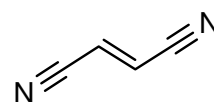
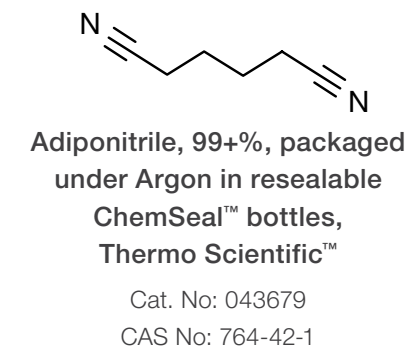
Tetrabutylammonium hydrogen
sulfate, 99%, for HPLC,
Thermo Scientific™

Cat. No: 011528
CAS No: 14283-07-9



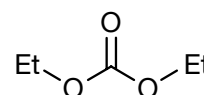
Tetrabutylammonium bromide,
99+%, Thermo Scientific™

Cat. No: 011528
CAS No: 14283-07-9



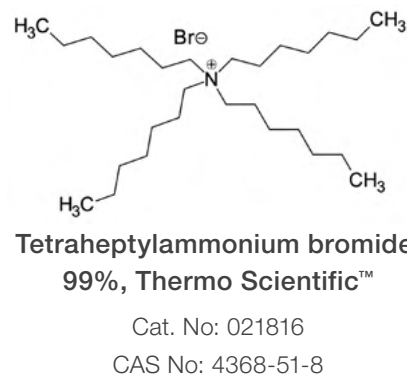
Fumaronitrile, 98.0+%,
Thermo Scientific™

Cat. No: L14911
CAS No: 764-42-1



Diethyl carbonate, 99%,
Thermo Scientific™

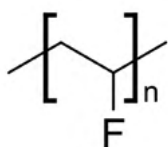
Cat. No: A19322
CAS No: 688-74-4



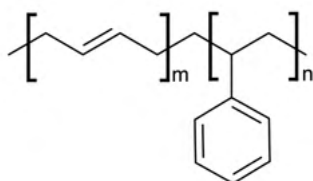
Solid electrolyte formulation materials

Product Description	Formula
LLZTO: Lithium lanthanum zirconium tantalum oxide, solid-electrolyte	$\text{Li}_{6.4}\text{La}_3\text{Zr}_{1.4}\text{Ta}_{0.6}\text{O}_{12}$
LPS: Lithium phosphorus sulfide	$\text{Li}_7\text{P}_3\text{S}_{11}$
LPSCI: Lithium phosphorus sulfur chloride	$\text{Li}_6\text{PS}_5\text{Cl}$
LATP: Lithium aluminum titanium phosphate	$\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$
LAGP: Lithium aluminum germanium phosphate	$\text{Li}_{1.5}\text{Al}_{0.5}\text{Ge}_{1.5}(\text{PO}_4)_3$
Lithium sulfide	Li_2S
Lithium chloride	LiCl
Phosphorus pentasulfide	P_2S_5

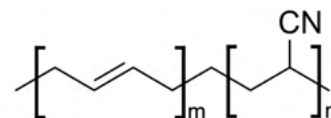
Binder formulation materials



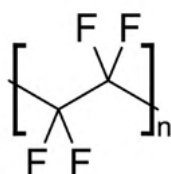
PVDF: Polyvinylidene fluoride,
Thermo Scientific™
CAS No: 24937-79-9



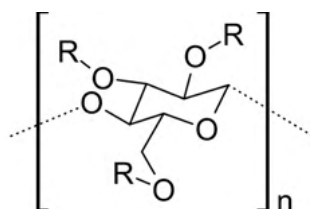
SBR: Styrene butadiene rubber,
Thermo Scientific™
CAS No: 9003-55-8



NBR: Nitrile butadiene rubber,
Thermo Scientific™
CAS No: 9003-18-3



PVDF: Polytetrafluoroethylene
Thermo Scientific™
CAS No: 9002-84-0



CMC: Carboxymethyl cellulose,
Thermo Scientific™
CAS No: 9000-11-7



Supporting your production needs

Custom and Bulk (C&B) services at a glance

When you are ready to take your research into the production stage, we can bridge that gap by providing end-to-end customer solutions to serve specialty fine chemical and analytical solvent needs.

Through our extensive global network of over 3,000 chemical suppliers, trust us to help manage your chemical purchasing process for: Specialty Chemicals - Semi Bulk – Bulk

Summary of capabilities:

1. Special packaging or pack type

This allows our customers to simplify scale-up costs effectively and it drives efficiency in handling, storage, and product integrity. At the same time, solvent safety is enhanced and it's one of our environmentally friendly solutions. Whether it's a different colored cap that is needed, or returnable drums and jerry cans for bulk-sizing, we've got you covered.

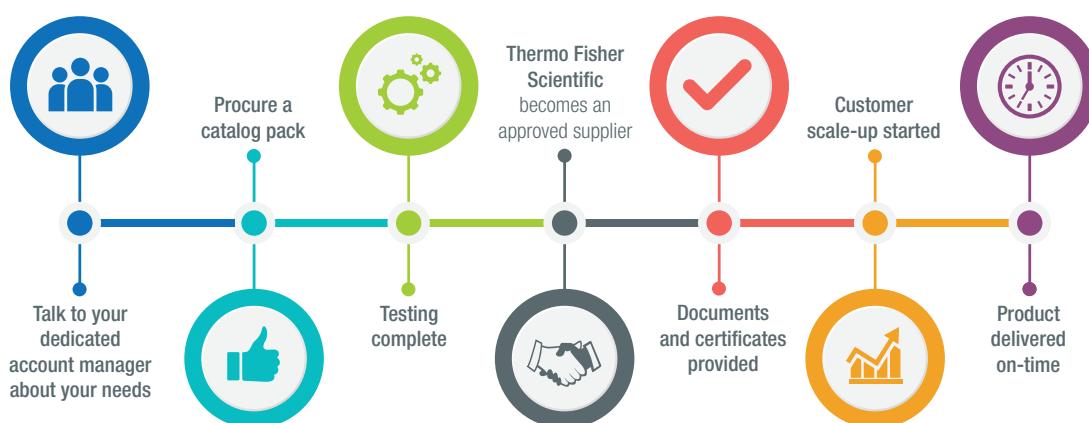
2. Different specification or labelling requirements

As part of understanding our customers' stringent packaging or labeling conditions, we allow customization of labels for easier identification. Custom specifications are also incorporated into the corresponding certificate of analysis (CoA) of these products.

3. Mixed blends

Chemicals that are compatible for mixing can be done so through our manufactured blends. This allows you to save time, reduce waste, and bring about consistent quality every single time.

Your journey guide



We enable our customers to focus on results with a fully managed service.



Elemental analysis and methods

In the intermediate stage of the battery industry, comprehensive physicochemical analysis of each component of the battery is conducted to investigate and develop product performance and safety.

Accurate quantification and structural analysis of unknown compounds is possible with IC and IC/HRMS. GC-MS is used to analyze the electrolyte composition of batteries, and Orbitrap technology can analyze electrolyte derivatives for R&D and academic research.

Elemental mass spectrometry and trace elemental analysis

The best performing ICP on the market deserves the best reagents. Our combined strengths in reagents and instrumentation guarantees unmatched quality for highest performance and the best results. Fisher Chemical Trace Metal and Primar Plus grade acids allow iCAP instruments to achieve the ultimate in performance and guarantee high-quality results every time.

We offer a complete line of acid grades to meet the most challenging applications:

- Fisher Chemical™ Optima™ Acids (1-100 ppt) – Suitable for detection at ppq levels. Feature the lowest metal content (1 ppt for key metals) and the highest purity
- Fisher Chemical™ Optima™ Trace Metal™ Acids (0.1-1 ppb) – High-purity, exceptional value. Specification measured at 0.1 ppb for key metals
- Fisher Chemical™ Primar Plus™ Acids (1-10 ppb) – The perfect choice for routine applications
- For Analysis, AR Acids (Low cadmium, lead and mercury level) – Suitable for use in environmental and food applications.

For your convenience, our high-purity acids products are provided in fully recyclable, robust packaging for easier and safer handling.

	AAS	ICP & ICP-MS	ICP-MS
Specification	<ul style="list-style-type: none">• Up to 40 parameters by ICP• 1 to 10 ppb	<ul style="list-style-type: none">• Up to 65 parameters by ICP-MS• Very low ppb level	<ul style="list-style-type: none">• Up to 65 parameters by ICP-MS• <10 ppt level
Grade	Fisher Primar Plus® grade	Fisher Trace Metal® grade	Fisher Chemical Optima® grade



Elemental analysis and methods continued

ICP-Mass Spectrometry (ICP-MS)

ICP-MS is the routine tool for multi-element analysis, from ultra-trace (ppq) to matrix (%). The entire periodic table can be analyzed routinely in a few minutes. The Thermo Scientific portfolio features the most complete range of ICP-MS instrumentation. To exploit the full power of ICP-MS, chemicals of the highest quality and purity are required. Our combined strengths in chemicals and analytical instrumentation guarantees unmatched quality for highest performance

Fisher Chemical™ Optima™ Acids From ppt to as low as ppq level detection

Product code	Product description	Pack size	Packaging
A465	Acetic Acid Glacial min. 99%, Optima	250 mL, 500 mL, 1 L	Pre-cleaned FEP
A470	Ammonia Solution 20-22%, Optima	250 mL, 500 mL, 1 L	Pre-cleaned HDPE
A471	Hydrobromic Acid 44-49%, Optima	500 mL	Pre-cleaned FEP
A466	Hydrochloric Acid 32-35%, Optima	250 mL, 500 mL, 1 L	Pre-cleaned PFA
A463	Hydrofluoric Acid 47-51%, Optima	250 mL, 500 mL, 1 L	Pre-cleaned PFA
P170	Hydrogen Peroxide 30-32%, Optima	500 mL	Pre-cleaned FEP
A467	Nitric Acid 67-69%, Optima	250 mL, 500 mL, 1 L	Pre-cleaned FEP
A468	Sulfuric Acid 93-98%, Optima	250 mL, 500 mL, 1 L	Pre-cleaned FEP
W9	Water, Optima	500 mL, 1 L, 2 L	Pre-cleaned LDPE

ICP-Optical Emission Spectroscopy (ICP-OES)

ICP-OES is a fast multi-element analysis technique capable of determining up to 72 elements in a very wide range of samples, including food, environmental, metallurgy and petrochemical samples.

With detection limit requirements from ppm to ppb levels, the Thermo Scientific™ iCAP™ 7000 Series ICP-OES is the laboratory workhorse for multi-element analysis, providing stable, efficient and low-cost elemental analysis for all facilities. It is your simplified route to compliance in environmental, pharmaceutical and food safety fields, and a robust solution for exploratory or QA/QC applications.

Fisher Chemical™ Trace Metal Acids From ppb to ppt level detection

Product code	Product description	Pack size	Packaging
A507	Acetic Acid, glacial min 99%, Trace Metal	500 mL, 1 L, 2.5 L	HDPE bottle
A512	Ammonia Solution 20-22%, Trace Metal	500 mL	HDPE bottle
A508	Hydrochloric Acid 34-37%, Trace Metal	500 mL, 1 L, 2.5 L	HDPE bottle
A513	Hydrofluoric Acid 47-51%, Trace Metal	500 mL	HDPE bottle
A509	Nitric Acid 67-69%, Trace Metal	500 mL, 1 L, 2.5 L	HDPE bottle
P/1292	Perchloric Acid 65-71%, Trace Metal	500 mL, 1L	PVC coated bottle
A510	Sulfuric Acid 93-98%, Trace Metal	500 mL, 1 L, 2.5 L	HDPE bottle



Elemental analysis and methods continued

Atomic Absorption Spectrometry (AAS)

AAS provides parts per million and parts per billion detection limits for most metallic elements in many different sample matrices with minimal interferences. Although invented over 50 years ago, AAS is still the technique of choice for many laboratories.

With a dedicated flame, furnace or combined flame and furnace options, the fast, easy-to-use and fully automated Thermo Scientific™ iCE 3000 Series AAS offers refreshingly good value for money. Our scientists designed this complete AAS portfolio for your demanding analytical needs, offering stunning simplicity, innovative design and superior analytical performance, in a compact package.

Fisher Chemical™ Primar Plus Acids From *ppb* level detection

Range of acids for trace elemental analysis tested up to 40 elements at ppb levels at ICP. 1-10 ppb level detection.

Product code	Product description	Pack size	Packaging
A/0411	Acetic Acid Glacial >99.8%, Primar Plus	500 mL, 1 L, 2.5 L	HDPE bottle
H/1196	Hydrochloric Acid min. 37%, Primar Plus	500 mL, 1 L, 2.5 L	HDPE bottle
N/2272	Nitric Acid min. 68%, Primar Plus	500 mL, 1 L, 2.5 L	HDPE bottle
S/9231	Sulfuric Acid min. 95%, Primar Plus	500 mL, 1 L, 2.5 L	HDPE bottle

Additional resources

Learn more about our products in detail through our High purity acids brochure

Scan the QR code to download



Elemental analysis and methods continued

Thermo Scientific™ Specpure™ analytical standards

Our range of Thermo Scientific Specpure™ products is our comprehensive offering of spectrochemical analytical standard solutions.

Specpure standards are unsurpassed in accuracy, purity and quality. Our atomic absorption standards solutions are accurate to $\pm 1.0\%$ and the plasma solutions to $\pm 0.3\%$.

Specpure™ atomic absorption standards

These solutions are intended for use with either flame or furnace absorption spectroscopy. Our standards are the most frequently used instrumental technique for elemental analysis. The Thermo Scientific range offers 70 single element aqueous solutions at 1,000 $\mu\text{g}/\text{mL}$ in both 100 mL and 500 mL sizes.

Specpure™ plasma standards

These solutions are intended for ICP-OES, ICP-MS, XRF, and other techniques for elemental analysis. These techniques are capable of determining the concentrations of many elements quickly, either simultaneously or sequentially.

Features of Specpure™ analytical standards

- A NIST-traceable Certificate of Analysis is included with each standard solution
- These standards are ISO9001, ISO Guide 34, and ISO/IEC17025
- Expiration date stickers are included with each standard solution
- Certified accuracy of $\pm 1.0\%$ for atomic absorption standards and $\pm 0.3\%$ for plasma solutions from the stated concentration



Additional resources

Learn more about our products in detail through our Analytical standards brochure

Scan the QR code to download



Research

Production

Analysis



Elemental analysis and methods continued

Stock No. Element, matrix	AAS Standard 1,000 ppm	Plasma Standard 1,000 ppm	Plasma Standard 10,000 ppm	Stock No. Element, matrix	AAS Standard 1,000 ppm	Plasma Standard 1,000 ppm	Plasma Standard 10,000 ppm
Aluminum, HCl	33557	13856	14405	Molybdenum, HNO ₃ /tr. HF	35764	35758	35766
Aluminum, HNO ₃	–	38727	38721	Molybdenum, NH ₄ OH	–	38719	38726
Antimony, HCl	47197	47103	47147	Neodymium, HNO ₃	88081	13882	14431
Antimony, H ₂ O/tartaric acid/tr. HNO ₃	–	41682	41683	Nickel, HNO ₃	88082	13839	14414
Arsenic, HNO ₃	33559	13836	14369	Niobium, HF	88083	13831	14396
Barium, HNO ₃	88052	13876	14423	Osmium, HCl	42239	13871	–
Beryllium, HNO ₃	88053	13848	14406	Palladium, HCl	88085	13833	14432
Bismuth, HNO ₃	88054	13822	14388	Phosphorus, HNO ₃	89887	13862	47152
Boron, NH ₄ OH	–	13859	14370	Platinum, HCl	88086	13827	14397
Boron, H ₂ O	88055	39147	–	Potassium, HNO ₃	88087	13866	14379
Cadmium, HNO ₃	88056	13813	14424	Praseodymium, HNO ₃	88088	13812	14433
Calcium, HNO ₃	88057	13852	14407	Rhenium, HNO ₃	88089	13817	14416
Cerium, HNO ₃	30520	13815	14371	Rhodium, HCl	88090	35754	35763
Cesium, HNO ₃	88058	13825	14425	Rubidium, HNO ₃	88091	13872	14380
Chromium, HCl	88059	13864	14408	Ruthenium, HCl	89117	35767	35773
Chromium, HNO ₃	–	38728	38722	Samarium, HNO ₃	88092	13854	14417
Cobalt, HNO ₃	88060	13828	14390	Scandium, HNO ₃	88093	35769	35755
Copper, HNO ₃	88061	13867	14372	Selenium, HNO ₃	88094	13845	14381
Dysprosium, HNO ₃	88062	13838	14426	Silicon, H ₂ O/tr. F ⁻	47277	38717	38723
Erbium, HNO ₃	88063	13877	14409	HNO ₃	88096	13849	14418
Europium, HNO ₃	88064	35753	35761	Sodium, HNO ₃	88097	13832	14400
Gadolinium, HNO ₃	88065	13829	14373	Strontium, HNO ₃	88098	13874	14382
Gallium, HNO ₃ /tr. HF	88066	13869	14427	Sulfur, HNO ₃	22958	13842	14436
Germanium, HNO ₃ /tr. HF	88067	13841	14410	Tantalum, HF	89888	13840	14419
Germanium, H ₂ O	–	42242	–	Tellurium, HCl	47130	47183	47187
Gold, HCl	88068	13881	14392	Terbium, HNO ₃	88110	13860	14383
Hafnium, HCl	88069	13843	14374	Thallium, HNO ₃	88111	13851	14437
Holmium, HNO ₃	88070	35756	35762	Thulium, HNO ₃	89889	13824	14402
Indium, HNO ₃	88071	13846	14411	Tin, HCl	88112	13863	14384
Iridium, HCl	88072	35751	35752	Titanium, HNO ₃ /tr. HF	35771	35768	35759
Iron, HNO ₃	47282	47206	47221	Titanium, H ₂ O/tr. F ⁻	–	38720	38725
Lanthanum, HNO ₃	88074	13870	14429	HNO ₃ /tr. HF	35760	35770	35772
Lead, HNO ₃	88075	13853	14412	Tungsten, H ₂ O	–	42248	42249
Lithium, HNO ₃	88076	13821	14394	Vanadium, HNO ₃	88116	13850	14385
Lutetium, HNO ₃	89886	35765	35757	Ytterbium, HNO ₃	89890	13819	14439
Magnesium, HNO ₃	88077	13861	14430	Yttrium, HNO ₃	88117	13855	14422
Manganese, HNO ₃	88078	13826	14413	Zinc, HNO ₃	88118	13835	14404
Mercury, HNO ₃	88079	13865	14395	Zirconium, HCl	88119	13875	14386

Full product listing is available online.



Liquid chromatography

	HPLC	LC-MS	UHPLC-MS	GC
Detector	<ul style="list-style-type: none"> • PDA, UV 	<ul style="list-style-type: none"> • HPLC – Mass spec. • UHPLC with UV 	<ul style="list-style-type: none"> • UHPLC with Mass spec. • UHPLC with Mass spec. & UV 	<ul style="list-style-type: none"> • GC-ECD, GC-FID
Grade	<ul style="list-style-type: none"> • HPLC grade 	<ul style="list-style-type: none"> • Optima® LC-MS grade 	<ul style="list-style-type: none"> • UHPLC-MS grade 	<ul style="list-style-type: none"> • Optima HPLC-GC • GC Headspace • GC Distol

Fisher Chemical™

HPLC grade solvents

Key features:

- Meet ACS specifications
- Submicron filtered
- Supplied in specially cleaned bottles
- Blanketed with inert gas to maintain integrity
- Certificate of Analysis available online
- Scan QR codes on label for CoA and SDS
- Bulk size options available

Cat. No.	Description	Pack sizes
A/0406	Acetic Acid, Glacial (HPLC), Fisher Chemical™	500 mL, 1 L
A/0606	Acetone (HPLC), Fisher Chemical™	1 L, 2.5 L
A/0626	Acetonitrile, for HPLC, Fisher Chemical™	1 L, 2.5 L, 5 L
A/0627	Acetonitrile, HPLC for Gradient Analysis, meets analytical specification of Ph.Eur, Fisher Chemical™	1 L, 2.5 L, 5 L
A/0636	Acetonitrile, Certified, for HPLC-RMN with Low Propionitrile Level, Fisher Chemical™	1 L, 2.5 L
C/4756	n-Butyl Chloride (HPLC), Fisher Chemical™	1 L, 2.5 L
C/4966	Chloroform, Stabilized with Amylene, for HPLC, Fisher Chemical™	1 L, 2.5 L
C/8936	Cyclohexane, for HPLC, Fisher Chemical™	1 L, 2.5 L
D/1756	1,2-Dichloroethane, for HPLC, Fisher Chemical™	1 L, 2.5 L
D/1856	Dichloromethane, for HPLC, Stabilised with Amylene, Fisher Chemical™	1 L, 2.5 L, 5 L
D/1857	Dichloromethane, for HPLC, Unstabilised, Fisher Chemical™	1 L, 2.5 L
D/2506	Diethyl Ether, for HPLC, Stabilised with Ethanol, Fisher Chemical™	1 L, 2.5 L
D/3846	DimethylFormamide, for HPLC, Fisher Chemical™	1 L, 2.5 L
D/4125	Dimethyl Sulfoxide, for HPLC, Fisher Chemical™	250 mL, 500 mL, 2.5 L
D/4556	1,4-Dioxane, 99.5+%, for HPLC, Unstabilised, Fisher Chemical™	1 L, 2.5 L
E/0665	Ethanol Absolute, for HPLC, Fisher Chemical™	1 L, 2.5 L
E/0906	Ethyl Acetate, for HPLC, Fisher Chemical™	1 L, 2.5 L
H/0106	Heptane, for HPLC, approx. 99% n-Heptane, Fisher Chemical™	1 L, 2.5 L
H/0107	Heptane, HPLC for fluorescence detection, approx. 99% n-Heptane, Fisher Chemical™	1 L, 2.5 L
H/0405	Isohexane, for HPLC, contains <5% n-Hexane, Fisher Chemical™	1 L, 2.5 L, 5 L, 25 L
H/0406	Hexanes, for HPLC, 95% n-Hexane approx., Fisher Chemical™	1 L, 2.5 L, 5 L
H/0409	Hexanes, HPLC for fluorescence detection, 95% n-Hexane approx., Fisher Chemical™	1 L, 2.5 L
M/4056	Methanol, for HPLC, Fisher Chemical™	1 L, 2.5 L, 5 L
M/4058	Methanol, HPLC for Gradient Analysis, Fisher Chemical™	1 L, 2.5 L, 5 L
M/4496	Methyl-Tert-Butyl Ether, for HPLC, Fisher Chemical™	2.5 L
P/1006	Pentane, for HPLC, Mixed Isomers, Fisher Chemical™	1 L, 2.5 L
P/7486	Propan-1-ol, for HPLC, Fisher Chemical™	1 L, 2.5 L
P/7507	Isopropanol, for HPLC, Fisher Chemical™	1 L, 2.5 L
T/0706	Tetrahydrofuran, for HPLC, Unstabilised, Fisher Chemical™	1 L, 2.5 L
T/2306	Toluene, for HPLC, Fisher Chemical™	1 L, 2.5 L
T/3606	2,2,4-Trimethylpentane (Isooctane), for HPLC, Fisher Chemical™	1 L, 2.5 L, 5 L
W/0106	Water, HPLC for Gradient Analysis, Fisher Chemical™	1 L, 2.5 L

Research

Production

Analysis



Contact us

Liquid chromatography continued

Fisher Chemical® Optima™ grade LC-MS Solvents

Fisher Chemical™ Optima™ LC-MS grade solvents lead the industry with LC-UV/MS suitability specifications and a strict specification of low level trace metals tested by ICP-MS. For reproducible performance of your LC-MS mobile phase, choose Optima LC/MS grade products:

- Solvents
- Mobile Phases Blends
- Reagents and Additives

Key features:

- High purity and low trace metals (tested for up to 17 elements)
- Innovative LC/UV and LC-MS gradient tests
- Filtered at 0.1 µm for acetonitrile, methanol and water



Cat. No.	Description	Packaging	Sizes
A955	Acetonitrile	Amber Glass Bottles	500 mL, 1, 2.5 and 4 L
A456	Methanol	Amber Glass Bottles	500 mL, 1, 2.5 and 4 L
W6	Water	Amber Glass Bottles	500 mL, 1, 2.5 and 4 L
A461	2-Propanol	Amber Glass Bottles	500 mL, 1, 2.5 and 4 L

Additional resources

Learn more about our products in detail through our Solvents, mobile phase blends and additives brochure

Scan the QR code to download



Liquid chromatography continued

Thermo Scientific™ UHPLC-MS grade solvents

Thermo Fisher Scientific has developed ultra-pure solvents will provide a very low mass noise level in both positive and negative mode ionization, minimal metal ion content, and very low UHPLC/UV response using photo diode array detection.

These high purity solvents are specifically qualified for UHPLC-MS and offered in Acetonitrile, Methanol, and Water.

Key features:

- A “sweet” cut from our distillation process with the highest purity (methanol and acetonitrile)
- Thoroughly tested with LC-UV/MS gradients for LC-MS suitability
- Packaged in borosilicate bottles to ensure extremely low leachable Na⁺ and K⁺ to reduce adduct formation
- No fluoropolymer liners used in caps to eliminate leachable background interfering with PFAS analysis
- Filtered at 0.1 µm

Cat. No.	Solvent	Pack size	Packaging
A956-1	Acetonitrile	1 L	Borosilicate Glass
A458-1	Methanol	1 L	Borosilicate Glass
W8-1	Water	1 L	Borosilicate Glass

A UHPLC-MS solvent kit (Cat. No. UHPLMSKIT) is recommended for use with installation of a new LC-MS system, and kit includes

- A956-1 Acetonitrile 1 × 1 L
- A458-1 Methanol 2 × 1 L
- W8-1 Water 1 × 1 L
- T111101000 Thermo Scientific™ ChromaCare™ Flush Solution 1 × 1 L *

* A blend used to clean the LC/MS system flow path and consists of 25% (v/v) each of acetonitrile, methanol, water and 2-propanol (IPA).



Additional resources

Learn more about our products in detail through our HPLC and UHPLC-MS application brochures

Scan the QR code to download



Research

Production

Analysis



Contact us

Gas chromatography

Fisher Chemical™ GC headspace solvents

To achieve optimum laboratory testing conditions, solvents must be free of interference. If you use a solvent not routinely tested for the absence of low-boiling organics, you risk the accuracy of your analysis. The solution is simple: Use the clean and reliable Fisher Chemical™ GC Headspace grade solvents.

Key features:

- Made to high purity for accurate and repeatable determination of trace levels of Class 1, Class 2, and Class 3 residual solvents in samples
- Tested by UV absorbance to ensure low organic contamination
- Tested by GC FID
- Processed for low water content to facilitate organic volatile impurity extraction
- Packaged under an inert atmosphere to maximize (unopened) shelf life



Cat. No.	Description	Pack size
W101	Water	1 L
D1391	DMSO, Dimethyl Sulfoxide	1 L
D1331	DMF, N,N-Dimethylformamide	1 L
D1601	DMAC, N,N-Dimethylacetamide	1 L
N1401	NMP, N-Methyl-2-Pyrrolidone	1 L

Additional resources

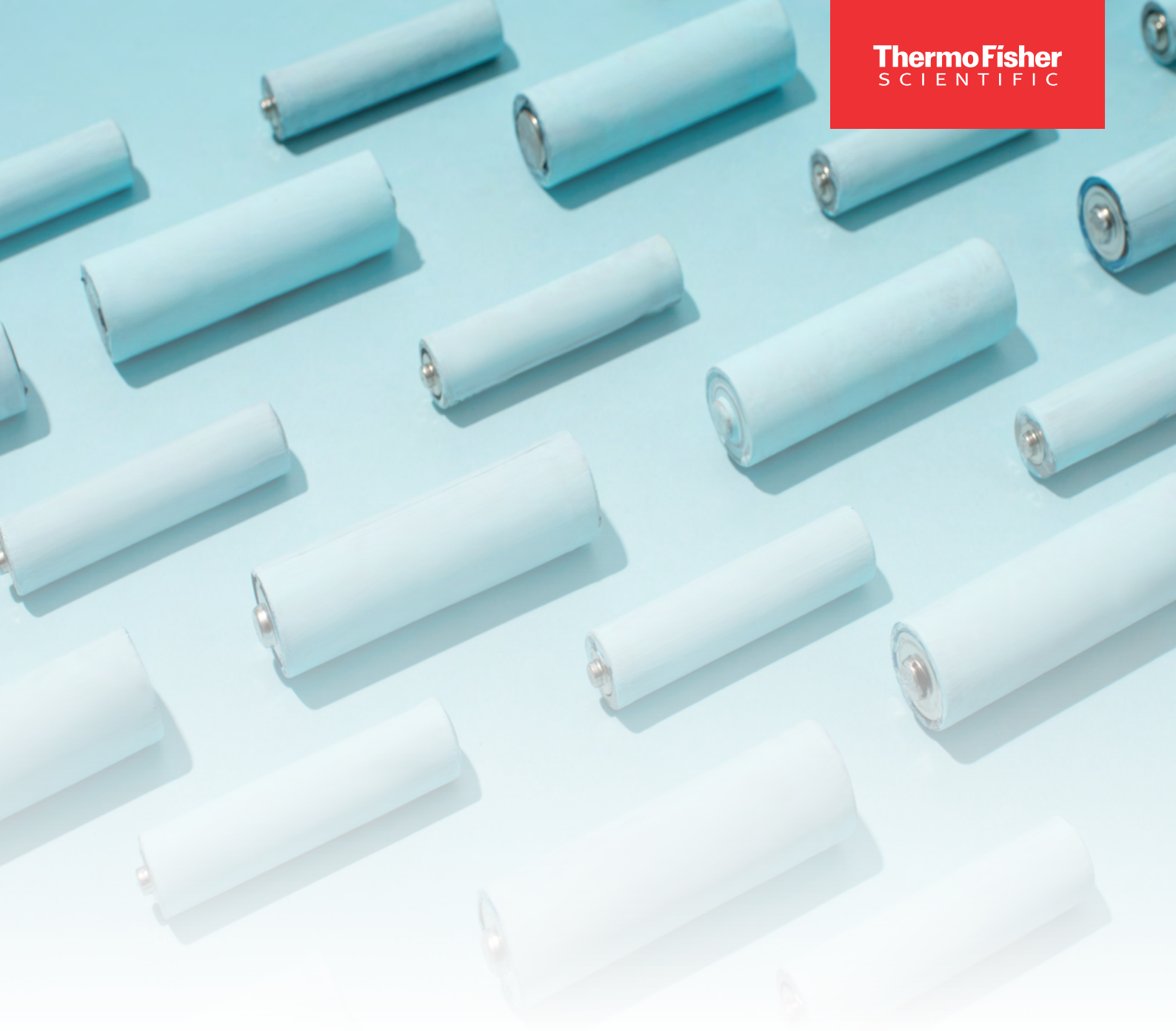
Learn more about our products in detail through our Solvents and blends brochure for GC

Scan the QR code to download



Periodic table of elements





Contact us today at thermofisher.com/chemicals/batteries

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