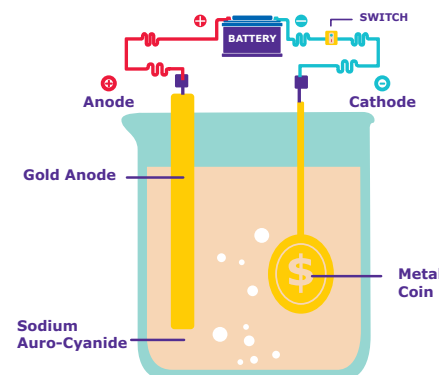


## Electroplating

Metal salts are widely used in Electroplating industry to improve the surface properties of of an object, such as abrasion and corrosion resistance, lubricity, reflectivity, electrical conductivity, or aesthetics. Especially precious metal salts are very useful in the electronics industry for plating components. Other industries, such as automotive, jewelry, and aerospace rely on precious metal-plated components.



Industry	Applications	Gold Salts	Silver salts	Platinum Salts	Palladium Salts	Rhodium Salts	Ruthenium Salts
Electronic Industries	Connectors & Resistors	X	X	X	X	X	X
	Smart cards and lead Frames	X	X		X		
	Relays	X				X	
Aerospace Industry	Aerospace coatings			X			X
	Hydrogen Economy			X			X
Medical Industry	Plating for Dental/implant	X		X	X	X	

Name	Specifications	Composition	Cat No
Copper(II) sulfate pentahydrate	99.999% trace metals basis	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	<b>203165</b>
Gold(III) chloride trihydrate	$\geq 99.9\%$ trace metals basis	$\text{HAuCl}_4 \cdot 3\text{H}_2\text{O}$	<b>520918</b>
Nickel(II) sulfate heptahydrate	99.999% trace metals basis	$\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$	<b>203890</b>
Palladium(II) nitrate dihydrate	$\sim 40\%$ Pd basis	$\text{Pd}(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$	<b>76070</b>
Platinum(IV) chloride	$\geq 99.9\%$ trace metals basis	$\text{PtCl}_4$	<b>520640</b>
Potassium tetrachloroplatinate(II)	$\geq 99.9\%$ trace metals basis	$\text{K}_2\text{PtCl}_4$	<b>520853</b>
Rhodium(III) nitrate hydrate	$\sim 36\%$ rhodium (Rh) basis	$\text{Rh}(\text{NO}_3)_3 \cdot x\text{H}_2\text{O}$	<b>83750</b>
Rhodium(III) chloride hydrate	99.95% trace metals basis	$\text{RhCl}_3 \cdot x\text{H}_2\text{O}$	<b>450286</b>
Ruthenium(III) chloride hydrate	99.98% trace metals basis	$\text{RuCl}_3 \cdot x\text{H}_2\text{O}$	<b>463779</b>
Silver nitrate	99.9999% trace metals basis	$\text{AgNO}_3$	<b>204390</b>

## Metal Nitrates for Metal Oxide Thin films

Metal nitrate precursors have been utilised to synthesise solution-processed metal-oxide thin films for use in semiconductor, thin-film transistor (TFT), and solar cell applications.

We provide a diverse selection of metal nitrate salts in various purities.

Name	Specifications	Composition	Cat. No.
Aluminum nitrate nonahydrate	99.997% trace metals basis	$\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$	<b>229415</b>
Cerium(III) nitrate hexahydrate	99% trace metals basis	$\text{Ce}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$	<b>238538</b>
Gallium(III) nitrate hydrate	crystalline, 99.9% trace metals basis	$\text{Ga}(\text{NO}_3)_3 \cdot x\text{H}_2\text{O}$	<b>289892</b>
Indium(III) nitrate hydrate	99.99% trace metals basis	$\text{In}(\text{NO}_3)_3 \cdot x\text{H}_2\text{O}$	<b>326127</b>
Lanthanum(III) nitrate hexahydrate	99.99% trace metals basis	$\text{La}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$	<b>331937</b>
Nickel(II) nitrate hexahydrate	99.999% trace metals basis	$\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	<b>203874</b>
Rhodium(III) nitrate hydrate	$\sim 36\%$ rhodium (Rh) basis	$\text{N}_3\text{O}_9\text{Rh} \cdot x\text{H}_2\text{O}$	<b>83750</b>

[SigmaAldrich.com](https://www.sigmaaldrich.com)

Merck KGaA  
Frankfurter Strasse 250  
64293 Darmstadt, Germany

We have built a unique collection of life science brands with unrivalled experience in supporting your scientific advancements.

**Millipore. Sigma-Aldrich. Supelco. Milli-Q. SAFC. BioReliance.**

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51870  
10/2023

# Unlock the Power of Purity: High purity Metal salts

## Available product types:

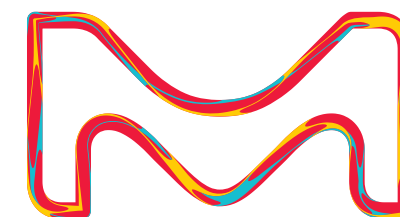
- Alkali & Alkaline Metal Salts
- Transition Metal Salts
- Rare Earth Metal Salts
- Precious Metal Salts
- Metaloid salts

## Specialized salt offerings:

- Redi Dri™
- AnhydroBeads™
- Technipur®

## Maximize Research Reliability, Minimize Waste with Improved Product Packaging

Metal salts play a vital role in research, development, and the production of advanced technologies that require exceptional properties, performance, and quality. Designed to optimize your research outcomes, our diverse collection of metal salts includes both anhydrous and hydrated forms, with purities ranging from 99.9% to 99.999% based on ICP-Mass and ICP-OES analysis.



The Life Science business of Merck operates as MilliporeSigma in the U.S. and Canada.

**Sigma-Aldrich®**  
Lab & Production Materials

## Let us support you with:

- A comprehensive portfolio with well-defined metal salts available in quantities that support a seamless scale-up from R&D to pilot scale
- A wide selection of purities, grades, as well as hydrated and anhydrous forms
- Consistent, reliable, and transparent supply chains for risk mitigation
- Purity ranges from 99.9% to 99.999% on a trace metal basis
- Innovative packaging incorporating desiccating technology

Explore our wide range of metal salts for incomparable performance and economy.

To find out more about our Metal Salts, visit [www.sigmaaldrich.com/metalsalts](http://www.sigmaaldrich.com/metalsalts)

## Alkali Metal Salts

Achieve enhanced application performance with our extensive selection of alkali salts. Our portfolio encompasses a wide variety of salts with diverse chemical compositions, quantities, and purities, tailored to meet your specific needs.

Name	Specifications	Composition	Cat. No.
Cesium iodide	99.999% trace metals basis	CsI	<b>203033</b>
Lithium fluoride	≥99.99% trace metals basis	LiF	<b>449903</b>
Lithium carbonate	99.99% trace metals basis	Li <sub>2</sub> CO <sub>3</sub>	<b>431559</b>
Lithium bis(trifluoromethanesulfonyl)imide	anhydrous, 99.99% trace metals basis	CF <sub>3</sub> SO <sub>2</sub> NLiSO <sub>2</sub> CF <sub>3</sub>	<b>919977</b>
Potassium tetrafluoroborate	≥99.99% trace metals basis	KBF <sub>4</sub>	<b>455903</b>
Rubidium chloride	ReagentPlus®, ≥99.0% (metals basis)	RbCl	<b>R2252</b>

## Alkaline Earth Metal Salts

Discover our portfolio of premium alkaline earth metal salts, which supports a wide range of applications in pharmaceuticals, fertilizers, agriculture, water treatment, and metallurgy.

Name	Specifications	Composition	Cat. No.
Barium carbonate	99.999% trace metals basis	BaCO <sub>3</sub>	<b>202711</b>
Calcium sulfate	≥99.99% trace metals basis	CaSO <sub>4</sub>	<b>255696</b>
Magnesium nitrate hexahydrate	99.999% trace metals basis	Mg(NO <sub>3</sub> ) <sub>2</sub> · 6H <sub>2</sub> O	<b>203696</b>
Magnesium chloride hexahydrate	99.995% trace metals basis	MgCl <sub>2</sub> · 6H <sub>2</sub> O	<b>255777</b>
Strontium chloride hexahydrate	99.995% trace metals basis	SrCl <sub>2</sub> · 6H <sub>2</sub> O	<b>204463</b>

## Transition Metal Salts

Transition salts have unique chemical properties that make them crucial in many fields, such as catalysis, materials science, and biochemistry. Our extensive collection of metal salts offers a wide range of options to assist you in creating novel materials and achieving your research objectives.

Name	Specifications	Composition	Cat. No.
Aluminum sulfate	99.99% trace metals basis	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	<b>202614</b>
Aluminum nitrate nonahydrate	99.997% trace metals basis	Al(NO <sub>3</sub> ) <sub>3</sub> · 9H <sub>2</sub> O	<b>229415</b>
Ammonium formate	≥99.995% trace metals basis	HCO <sub>2</sub> NH <sub>4</sub>	<b>516961</b>
Copper(II) sulfate pentahydrate	99.995% trace metals basis	CuSO <sub>4</sub> · 5H <sub>2</sub> O	<b>469130</b>
Copper(II) nitrate hydrate	99.999% trace metals basis	Cu(NO <sub>3</sub> ) <sub>2</sub> · xH <sub>2</sub> O	<b>229636</b>
Cobalt(II) nitrate hexahydrate	99.999% trace metals basis	Co(NO <sub>3</sub> ) <sub>2</sub> · 6H <sub>2</sub> O	<b>203106</b>
Iron(II) sulfate hydrate	99.999% trace metals basis	FeSO <sub>4</sub> · xH <sub>2</sub> O	<b>450278</b>
Manganese(II) nitrate hydrate	99.99% trace metals basis	Mn(NO <sub>3</sub> ) <sub>2</sub> · xH <sub>2</sub> O	<b>203742</b>
Molybdenum(V) chloride	95%	MoCl <sub>5</sub>	<b>208353</b>
Nickel(II) chloride hexahydrate	99.9% trace metals basis	NiCl <sub>2</sub> · 6H <sub>2</sub> O	<b>654507</b>
Zinc sulfate heptahydrate	≥99.95% trace metals basis	ZnSO <sub>4</sub> · 7H <sub>2</sub> O	<b>204986</b>
Zinc nitrate hydrate	99.999% trace metals basis	Zn(NO <sub>3</sub> ) <sub>2</sub> · xH <sub>2</sub> O	<b>230006</b>
Zirconium(IV) carbonate basic	≥40% ZrO <sub>2</sub> basis	Zr(OH) <sub>2</sub> CO <sub>3</sub> · ZrO <sub>2</sub>	<b>14616</b>

## Metaloid Salts

Metaloid salts have distinctive chemical properties that make them critical for many applications, such as semiconductors, glass, ceramics, and cosmetics. To support your research, we provide a diverse selection of metaloid salts with varying chemical compositions, quantities, and purities.

Name	Specifications	Composition	Cat. No.
Antimony(III) fluoride	powder, 99.8% trace metals basis	SbF <sub>3</sub>	<b>381292</b>
Arsenic(III) chloride	99.99% trace metals basis	AsCl <sub>3</sub>	<b>200077</b>
Germanium(IV) chloride	99.99% trace metals basis	GeCl <sub>4</sub>	<b>208450</b>
Germanium(II) iodide	≥99.8% trace metals basis	GeI <sub>2</sub>	<b>383260</b>
Tellurium tetrachloride	99%	TeCl <sub>4</sub>	<b>205338</b>

## Precious Metal Salts

Precious metal salts find extensive use across diverse fields such as catalysis, biological imaging, drug delivery, electrochemistry (as electrodes), and fuel cells. To enhance your research performance, we provide a comprehensive range of precious metal salts with varying chemical compositions, quantities, and purities.

Name	Specifications	Composition	Cat. No.
Ammonium hexachloroplatinate(IV)	99.995% trace metals basis	(NH <sub>4</sub> ) <sub>2</sub> PtCl <sub>6</sub>	<b>204021</b>
Gold(III) chloride trihydrate	≥99.9% trace metals basis	HAuCl <sub>4</sub> · 3H <sub>2</sub> O	<b>520918</b>
Palladium(II) nitrate dihydrate	~40% Pd basis	Pd(NO <sub>3</sub> ) <sub>2</sub> · 2H <sub>2</sub> O	<b>76070</b>
Platinum(IV) chloride	≥99.9% trace metals basis	PtCl <sub>4</sub>	<b>520640</b>
Potassium tetrachloroplatinate(II)	≥99.9% trace metals basis	K <sub>2</sub> PtCl <sub>4</sub>	<b>520853</b>
Ruthenium(III) chloride hydrate	99.98% trace metals basis	RuCl <sub>3</sub> · xH <sub>2</sub> O	<b>463779</b>
Rhodium(III) nitrate hydrate	~36% rhodium (Rh) basis	Rh(NO <sub>3</sub> ) <sub>3</sub> · xH <sub>2</sub> O	<b>83750</b>
Silver nitrate	99.9999% trace metals basis	AgNO <sub>3</sub>	<b>204390</b>

## Rare Earth Metal Salt

Rare earth salts are highly versatile materials with a wide range of applications in aerospace, defense, color, and displays. Leveraging the unique properties of rare earth elements, our portfolio enables you to unlock the full potential of rare earth salts for your specific needs.

Name	Specifications	Composition	Cat. No.
Cerium(III) nitrate hexahydrate	99.999% trace metals basis	Ce(NO <sub>3</sub> ) <sub>3</sub> · 6H <sub>2</sub> O	<b>202991</b>
Europium(III) chloride hexahydrate	99.99% trace metals basis	EuCl <sub>3</sub> · 6H <sub>2</sub> O	<b>203254</b>
Erbium(III) perchlorate solution	40 wt. % in H <sub>2</sub> O, 99.9% trace metals basis	Er(ClO <sub>4</sub> ) <sub>3</sub>	<b>444111</b>
Gadolinium(III) nitrate hexahydrate	crystals and lumps, 99.9% trace metals basis	Gd(NO <sub>3</sub> ) <sub>3</sub> · 6H <sub>2</sub> O	<b>211591</b>
Lanthanum(III) nitrate hexahydrate	99.999% trace metals basis	La(NO <sub>3</sub> ) <sub>3</sub> · 6H <sub>2</sub> O	<b>203548</b>
Neodymium(III) sulfate hydrate	99.9% trace metals basis	Nd <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> · xH <sub>2</sub> O	<b>325813</b>
Praseodymium(III) nitrate hexahydrate	99.9% trace metals basis	Pr(NO <sub>3</sub> ) <sub>3</sub> · 6H <sub>2</sub> O	<b>205133</b>
Terbium(III) nitrate pentahydrate	99.9% trace metals basis	Tb(NO <sub>3</sub> ) <sub>3</sub> · 5H <sub>2</sub> O	<b>325945</b>
Ytterbium(III) nitrate pentahydrate	99.9% trace metals basis	Yb(NO <sub>3</sub> ) <sub>3</sub> · 5H <sub>2</sub> O	<b>209147</b>

## Redi Dri™ Salts

Our free flowing Redi Dri™ packaging system provide superior performance in air- and moisture-sensitive applications due to the presence of desiccator in every bottle and limits the environmental effects that moisture can have on product quality.

### Features:

- Longer shelf-life, free flowing without addition of anti-caking agents reduces the waste
- Slower absorption of environmental moisture
- Conveniently resealable storage container in contrast to ampule
- Faster dissolution of Redi-Dri™ salts reduces waiting time and improves lab productivity



Name	Specifications	Composition	Cat. No.
Copper(II) sulfate	anhydrous, free-flowing, Redi-Dri™, ≥99.99% trace metals basis	CuSO <sub>4</sub>	<b>931071</b>

## Anhydrobeads™ Salts

Our AnhydroBeads™ salts provide superior performance in air- and moisture-sensitive applications due to their high-purity, monodisperse, and free-flowing properties.

### Features:

- Superior performance in air and moisture sensitive applications
- Monodisperse and free flowing for easy handling
- Consistent high quality and high purity from batch to batch
- Low volatility for safe and stable use, storage, and transport
- Low surface area-to-volume ratio at ~2 mm in diameter
- Purity range from 99.9% (3N) to 99.999% (5N)



Name	Specifications	Composition	Cat. No.
Barium bromide	AnhydroBeads™, -10 mesh, 99.999% trace metals basis	BaBr <sub>2</sub>	413607
Cerium(III) bromide	AnhydroBeads™, -10 mesh, 99.99% trace metals basis	CeBr <sub>3</sub>	563226
Cobalt(II) bromide	AnhydroBeads™, -10 mesh, 99.99% trace metals basis	CoBr <sub>2</sub>	427136
Copper(I) chloride	AnhydroBeads™, ≥99.99% trace metals basis	CuCl	651745
Europium(II) iodide	AnhydroBeads™, -10 mesh, 99.999% trace metals ba	EuI <sub>2</sub>	751499
Indium(I) iodide	AnhydroBeads™, -10 mesh, 99.999% trace metals basis	InI	413658
Iron(II) chloride	AnhydroBeads™, -10 mesh, 99.99% trace metals basis	FeCl <sub>2</sub>	450936
Lead(II) chloride	AnhydroBeads™, -10 mesh, 99.999%	PbCl <sub>2</sub>	449865
Lithium chloride	AnhydroBeads™, -10 mesh, ≥99.9% trace metals basis	LiCl	449881
Magnesium chloride	AnhydroBeads™, -10 mesh, 99.99% trace metals basis	MgCl <sub>2</sub>	449172
Silver chloride	AnhydroBeads™, -10 mesh, 99.998% trace metals basis	AgCl	449571
Sodium chloride	AnhydroBeads™, -10 mesh, 99.999% trace metals basis	NaCl	450006
Tin(II) iodide	AnhydroBeads™, -10 mesh, 99.99% trace metals basis	SnI <sub>2</sub>	409308

## Anhydrous Salts

Our anhydrous salts with purity from 97% to 99.999% are applicable for a wide range of applications, such as synthesis of Nanoparticles, catalysis, fabrication of cathode active and anode materials etc.

Name	Specifications	Composition	Cat. No.
Aluminum fluoride	anhydrous, powder, 99.8% trace metals basis	AlF <sub>3</sub>	449628
Copper(II) chloride	anhydrous, powder, ≥99.995% trace metals basis	CuCl <sub>2</sub>	451665
Calcium chloride	anhydrous, powder, 99.99% trace metals basis	CaCl <sub>2</sub>	499609
Gallium(II) chloride	anhydrous, 99.999% trace metals basis	GaCl <sub>2</sub>	413089
Iron(III) chloride	anhydrous, powder, ≥99.99% trace metals basis	FeCl <sub>3</sub>	451649
Lithium perchlorate	anhydrous, ≥99.9% trace metals basis	LiClO <sub>4</sub>	931969
Magnesium chloride	anhydrous, ≥98%	MgCl <sub>2</sub>	M8266
Nickel(II) sulfate	anhydrous, 99.99% trace metals basis	NiSO <sub>4</sub>	656895
Neodymium(III) chloride	anhydrous, powder, ≥99.99% trace metals basis	NdCl <sub>3</sub>	449946
Sodium carbonate	anhydrous, powder, 99.999% trace metals basis	Na <sub>2</sub> CO <sub>3</sub>	451614
Silver perchlorate	anhydrous, 97%	AgClO <sub>4</sub>	674583
Tin(IV) iodide, anhydrous	anhydrous, powder, 99.999% trace metals basis	SnI <sub>2</sub>	409294

## Technipur® Products

Our Technipur® grade products are offered in high purity for R&D to pilot scale for the technical industry such as, electroplating, Batteries, semiconductor etc. We are adding more products to our website.

### Features:

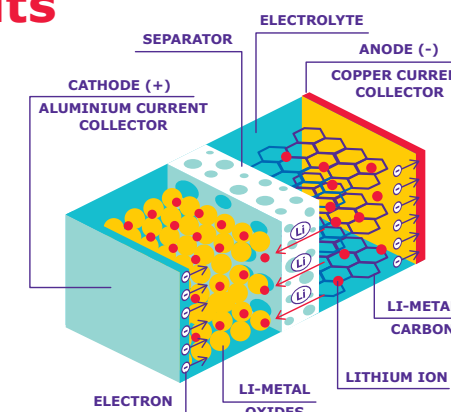
- Large sized prepacks tailored to your needs
- Scalable supply chain for your manufacturing needs
- Inventory availability maintained for rapid delivery
- Quality and documentation support

Name	Specifications	Composition	Cat. No.
Potassium tetrachloroplatinate(II)	Technipur®, ≥99.9% trace metals basis	K <sub>2</sub> PtCl <sub>4</sub>	925098
Silver carbonate	Technipur®, ≥99% trace metals basis	Ag <sub>2</sub> CO <sub>3</sub>	925063

## Applications of High Purity Salts

### Lithium-ion Batteries

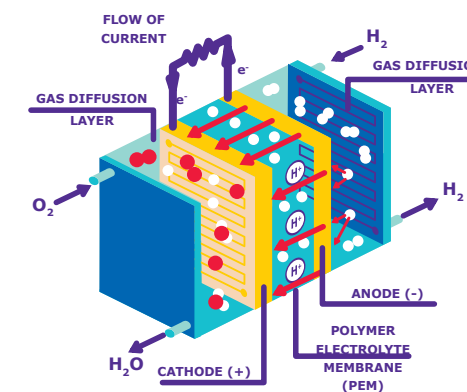
We offer a wide range of high-purity salts essential for synthesizing quality cathode materials. Maintaining purity is crucial to prevent impurities during battery cycling, which can lead to capacity loss, safety hazards, and unwanted side reactions. Extensive studies have demonstrated the use of high-purity electrolytic salts to enhance the performance and safety of lithium-ion batteries. Explore our portfolio to optimize your outcomes.



Name	Specifications	Composition	Cat. No.
Lithium hexafluorophosphate	battery grade, ≥99.99% trace metals basis	LiPF <sub>6</sub>	450227
Lithium nitrate	battery grade, anhydrous, ≥99.9% trace metals basis	LiNO <sub>3</sub>	930946
Lithium hydroxide monohydrate	battery grade, ≥99.9% trace metals basis	LiOH · H <sub>2</sub> O	930903
Lithium chloride	anhydrous, 99.95% trace metals basis	LiCl	916013
Lithium perchlorate	anhydrous, ≥99.9% trace metals basis	LiClO <sub>4</sub>	931969
Lithium tetrafluoroborate	ultra dry, powder, 99.99% trace metals basis	LiBF <sub>4</sub>	451622
Lithium fluoride	≥99.99% trace metals basis	LiF	449903
Manganese(II) nitrate hydrate	99.99% trace metals basis	Mn(NO <sub>3</sub> ) <sub>2</sub> · xH <sub>2</sub> O	203742
Cobalt(II) nitrate hexahydrate	99.999% trace metals basis	Co(NO <sub>3</sub> ) <sub>2</sub> · 6H <sub>2</sub> O	203106
Nickel(II) chloride hexahydrate	99.9% trace metals basis	NiCl <sub>2</sub> · 6H <sub>2</sub> O	654507
Nickel(II) nitrate hexahydrate	99.999% trace metals basis	Ni(NO <sub>3</sub> ) <sub>2</sub> · 6H <sub>2</sub> O	203874

### Fuel cell catalyst

Precious and non-precious metal salts have been widely used as synthesis catalysts for cathode and anode in proton exchange membrane fuel cells and direct methanol fuel cells by using chemical precipitation processes and colloidal methods.



Name	Specifications	Composition	Cat. No.
Platinum(IV) chloride	≥99.9% trace metals basis	PtCl <sub>4</sub>	520640
Potassium tetrachloroplatinate(II)	≥99.9% trace metals basis	K <sub>2</sub> PtCl <sub>4</sub>	520853
Palladium(II) nitrate dihydrate	~40% Pd basis	Pd(NO <sub>3</sub> ) <sub>2</sub> · 2H <sub>2</sub> O	76070
Ruthenium(III) chloride hydrate,	ReagentPlus®	RuCl <sub>3</sub> · xH <sub>2</sub> O	206229
Iridium(III) chloride hydrate	99.9% trace metals basis	IrCl <sub>3</sub> · xH <sub>2</sub> O	203491
Rhodium(III) nitrate hydrate	~36% rhodium (Rh) basis	N <sub>3</sub> O <sub>9</sub> Rh · xH <sub>2</sub> O	83750
Silver nitrate	anhydrous, ≥99.999% trace metals basis	AgNO <sub>3</sub>	792276
Manganese(II) nitrate hydrate	99.99% trace metals basis	Mn(NO <sub>3</sub> ) <sub>2</sub> · xH <sub>2</sub> O	203742
Copper(II) chloride dihydrate	99,999%	CuCl <sub>2</sub> · 2H <sub>2</sub> O	459097
Cerium(III) nitrate hexahydrate	99% trace metals basis	Ce(NO <sub>3</sub> ) <sub>3</sub> · 6H <sub>2</sub> O	238538
Praseodymium(III) nitrate hexahydrate	99.9% trace metals basis	Pr(NO <sub>3</sub> ) <sub>3</sub> · 6H <sub>2</sub> O	205133