

Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet**1. Product & Company Identification:**

Product:	Hydrion Buffer Salt pH 7.00
Manufacturer:	Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau
Telephone:	+49 (0) 9604 / 40 - 8988
Date of issue:	08.09.2014

Chemical Name: Hydrion Buffer Salt pH 7.00

Chemical Formula: Potassium phosphate monobasic and sodium phosphate dibasic

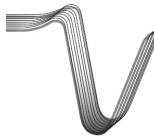
CAS Number: 7778-77-0 and 7558-79-4

2. Composition / Information on Ingredients:

Ingredient Name	CAS Number	% wt
Potassium phosphate monobasic	7778-77-0	30.0 - 40.0
Sodium phosphate dibasic	7558-79-4	60.0 - 70.0

Trace Impurities

Ingredient	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH
	TWA	STEL	TWA	STEL	TWA	STEL	IDLH
Potassium phosphate monobasic Toxicity (oral-rat) LD50 7100 mg/kg	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.
Sodium phosphate dibasic Toxicity (oral-rat) LD50 17 g/kg	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

3. Hazards Identification:

Emergency Overview: Potential Health Effects:

Acute Effects:

Inhalation: Prolonged Exposure may cause irritation of the nose, throat and respiratory tract.

Eye: Dust might be irritating to the eyes.

Skin: Prolonged contact may cause skin irritation or allergic reaction.

Ingestion: Can irritate stomach and cause mouth burns.

Carcinogenicity: IARC, NTP and OSHA do not list this product as a carcinogen.

Chronic Effects: Prolonged exposure to bulk powder may cause irritation to the eyes, skin and respiratory system.

HMIS: H #0, F #0, R #0, PPE

4. First Aid Measures:

Inhalation: Remove to fresh air. Give oxygen if breathing is difficult.

Eye contact: Flush thoroughly with water for 15 minutes.

Skin contact: Wash with soap and water.

Ingestion: Drink lots of water. Do not induce vomiting. Call a physician.

After first aid, get appropriate in-plant, paramedic, or community medical support.

5. Fire Fighting Measures:

Flash point: Non flammable

LEL: N/A

UEL: N/A

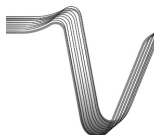
Flammability classification: Non flammable

Extinguishing media: Use extinguishing media appropriate for surrounding area.

Hazardous combustion products: May release fumes of phosphorus oxide if involved in fire.

Fire-fighting instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire-fighting equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

6. Accidental Release Measures:

Spill response notice:

Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See section 13, special instructions for disposal assistance.

Cleanup technique:

Absorb spilled liquid with non-reactive sorbent material. Sweep up material. Place material in a plastic bag. Mark bag „Non-hazardous trash“ and dispose of as normal refuse. Decontaminate the area of the spill with a soap solution.

Evacuation procedure:

Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of evacuation.

Special instructions (for accidental release):

Not applicable.

304 EHS RQ (40 CFR 355):

Not applicable.

D.O.T. emergency response guide number:

Not allocated.

7. Handling and Storage:

Storage requirements:

Store at controlled room temp in dry location. Avoid high temperatures and high humidities. Keep container close when not in use.

Handling precautions:

Pertains only to bulk powder handling

Ventilation:

Use adequate general or local ventilation to keep fume and dust levels as low as possible.

Respiration protection:

Use NIOSH approved dust respirator when handling bulk powder.

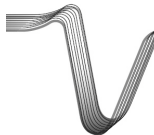
Eye protection:

Chemical splash goggles with side shields when handling bulk powder.

Gloves:

Natural rubber, butyl neoprene or equivalent. Wear full cover clothing when handling bulk powder.

Do not breath dust. Do not get into eyes. Avoid prolonged or repeated skin contact. Wash with cold water after contact. Do not take internally.



Material Safety Data Sheet

8. Exposure Controls / Personal Protection:

Engineering Controls:

Ventilation:

Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative controls:

Respiratory protection:

Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA.

Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective clothing/equipment:

Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

Safety stations:

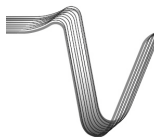
Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated equipment:

Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments:

Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

9. Physical and Chemical Properties:

Appearance:	White to off white granular or crystals
Odor:	Odorless powder
Vapor pressure:	NDA
Vapor density (Air=1):	NDA
Formula weight:	Potassium phosphate monobasic: 136.09 g Sodium phosphate dibasic: 141.96 g
Specific gravity (H ₂ O=1, at 4°C):	~1
pH:	7.00@25°C
Water solubility:	miscible
Other solubilities:	not determined
Boiling point:	100°C
Freezing/melting point:	NDA
Viscosity:	NDA
Refractive index:	NDA
Surface tension:	NDA
%volatile:	not volatile
Evaporation rate:	NDA

10. Stability and Reactivity:

Stability:

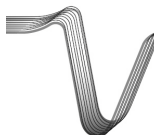
Hydron buffer salt is stable at room temperature in closed containers under normal storage and handling conditions.

Polymerization:

Hazardous polymerization cannot occur.

Chemical incompatibilities:

Hazardous reaction in aqueous solution may occur with chlorine, hypochlorous acid, hypochlorites, cyanides or sulfides.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

11. Toxicological Information:

Toxicity data:

Eye effects:	Not reported.
Skin effects:	Not reported.
Acute inhalation effects:	Human, inhalation, not reported
Acute oral effects:	Rat, oral, LD50: 7100 mg/kg, potassium phosphate monobasic Rat, oral, LD50: 17 g/kg, sodium phosphate dibasic
Carcinogenicity:	Not reported
Mutagenicity:	Not reported
Teratogenicity:	Not reported.

12. Ecological Information:

No ecological data available for this product.

13. Disposal Considerations:

EPA Waste ID Number:

None

Special instructions (disposal):

Open cold water tap completely, slowly pour the material to the drain. Flush system with plenty of water.

Empty container:

Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.

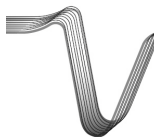
Notice (disposal):

These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. Transport Information:

DOT Transportation data (49 CFR 172.101):

Not regulated at this time.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

15. Regulatory Information:

EPA regulations:

RCRA hazardous waste number: Not listed (40 CFR 261.33)

RCRA hazardous waste classification (40 CFR 261): Not classified

SARA toxic chemical (40 CFR 372.65): Not listed

SARA EHS (extremely hazardous substance) (40 CFR 355): Not listed

OSHA regulations:

Air contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed.

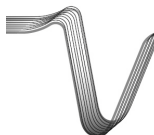
16. Other Information:

Disclaimer:

The data in this material safety data sheet relates only to the material designated herein and does not relate to use in combination with any other material that is not supplied by us as buffer salt.

The statements contained herein are offered for informational purposes only and is based on technical data that we believe to be reliable and accurate. The information and data are intended to be followed only by persons with technical skills and at their own discretion and risk. Since conditions are outside our control, we make no warranties, express or implied and assume no liability in connection with any use of this information.

We reserve right to revise this safety sheet from time to time.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

1. Product & Company Identification:

Product:	Hydrion Buffer Salt pH 4.00
Manufacturer:	Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau
Telephone:	+49 (0) 9604 / 40 - 8988
Date of issue:	08.09.2014

Chemical Name: Hydrion Buffer Salt pH 4.00

Chemical Formula: Potassium Biphthalate

CAS Number: 877-24-7

2. Composition / Information on Ingredients:

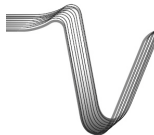
Ingredient Name	CAS Number	% wt
Potassium Biphthalate	877-24-7	100.00

Trace Impurities

Ingredient	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH
	TWA	STEL	TWA	STEL	TWA	STEL	IDLH
Potassium Biphthalate	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.	None Estab.
Toxicity (oral-rat) LD50 3200 mg/kg							

3. Hazards Identification:

Emergency Overview: Potential Health Effects:**Acute Effects:****Inhalation:** Prolonged Exposure may cause irritation of the nose, throat and respiratory tract.**Eye:** Dust might be irritating to the eyes.**Skin:** Prolonged contact may cause skin irritation or allergic reaction.**Ingestion:** Can irritate stomach and cause mouth burns.**Carcinogenicity:** IARC, NTP and OSHA do not list this product as a carcinogen.**Chronic Effects:** Prolonged exposure to bulk powder may cause irritation to the eyes, skin and respiratory system.**HMIS:** H #0, F #0, R #0, PPE



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

4. First Aid Measures:

Inhalation: Remove to fresh air. Give oxygen if breathing is difficult.

Eye contact: Flush thoroughly with water for 15 minutes.

Skin contact: Wash with soap and water.

Ingestion: Drink lots of water. Do not induce vomiting. Call a physician.

After first aid, get appropriate in-plant, paramedic, or community medical support.

5. Fire Fighting Measures:

Flash point: Non flammable

LEL: N/A

UEL: N/A

Flammability classification: Non flammable

Extinguishing media: Use extinguishing media appropriate for surrounding area.

Hazardous combustion products: May release fumes of phosphorus oxide if involved in fire.

Fire-fighting instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire-fighting equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.

6. Accidental Release Measures:

Spill response notice:

Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See section 13, special instructions for disposal assistance.

Spill/Leak procedures:

Carefully sweep up and discard. Clean spill area with cold water. If prepared buffer solution is spilled neutralize and mop area.

Small spills:

Wipe and clean area.

Containment:

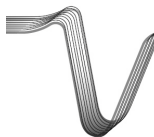
For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.

Cleanup technique:

Scoop up spilled material into a large beaker and dissolve with water. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.

Dispose of all wastes in accordance with federal, state and local regulation.

Regulatory requirements: Follow applicable OSHA regulations (29 CFR 1910.120).



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

7. Handling and Storage:

Storage requirements:

Store at controlled room temp in dry location. Avoid high temperatures and high humidities. Keep container close when not in use.

Handling precautions:

Pertains only to bulk powder handling

Ventilation:

Use adequate general or local ventilation to keep fume and dust levels as low as possible.

Respiration protection:

Use NIOSH approved dust respirator when handling bulk powder.

Eye protection:

Chemical splash goggles with side shields when handling bulk powder.

Gloves:

Natural rubber, butyl neoprene or equivalent. Wear full cover clothing when handling bulk powder.

Do not breath dust. Do not get into eyes. Avoid prolonged or repeated skin contact. Wash with cold water after contact. Do not take internally.

8. Exposure Controls / Personal Protection:

Engineering Controls:**Ventilation:**

Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

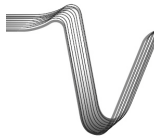
Administrative controls:**Respiratory protection:**

Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA.

Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective clothing/equipment:

Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

Safety stations:

Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated equipment:

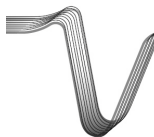
Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments:

Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

9. Physical and Chemical Properties:

Appearance:	White to off white granular or crystals
Odor:	Odorless powder
Vapor pressure:	NDA
Vapor density (Air=1):	NDA
Formula weight:	Potassium Biphthalate 204.2 g
Specific gravity (H ₂ O=1, at 4°C):	~1
pH:	4.00@25°C
Water solubility:	miscible
Other solubilities:	not determined
Boiling point:	100°C
Freezing/melting point:	NDA
Viscosity:	NDA
Refractive index:	NDA
Surface tension:	NDA
%volatile:	not volatile
Evaporation rate:	NDA



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

10. Stability and Reactivity:

Stability:

Hydriion buffer salt is stable at room temperature in closed containers under normal storage and handling conditions.

Polymerization:

Hazardous polymerization cannot occur.

Chemical incompatibilities:

Hazardous reaction in aqueous solution may occur with chlorine, hypochlorous acid, hypochlorites, cyanides or sulfides.

11. Toxicological Information:

Toxicity data:

Eye effects:	May cause eye mild irritation.
Skin effects:	Mild irritant to the skin and mucous membranes.
Acute inhalation effects:	Human, inhalation, not reported
Acute oral effects:	Rat, oral, LD50: 3200 mg/kg, potassium bithalate
Carcinogenicity:	Not reported
Mutagenicity:	Not reported
Teratogenicity:	Not reported.

12. Ecological Information:

No ecological data available for this product.

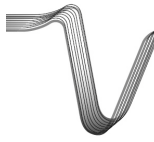
13. Disposal Considerations:

Special instructions (disposal):

Dilute material with excess water making a weaker than 5% solution. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system.

Notice (disposal):

These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

14. Transport Information:

DOT Transportation data (49 CFR 172.101):

Not currently regulated.

15. Regulatory Information:

EPA regulations:

RCRA hazardous waste number: Not listed (40 CFR 261.33)

RCRA hazardous waste classification (40 CFR 261): Not classified

SARA toxic chemical (40 CFR 372.65): Not listed

SARA EHS (extremely hazardous substance) (40 CFR 355): Not listed

OSHA regulations:

Air contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed.

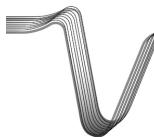
16. Other Information:

Disclaimer:

The data in this material safety data sheet relates only to the material designated herein and does not relate to use in combination with any other material that is not supplied by us as buffer salt.

The statements contained herein are offered for informational purposes only and is based on technical data that we believe to be reliable and accurate. The information and data are intended to be followed only by persons with technical skills and at their own discretion and risk. Since conditions are outside our control, we make no warranties, express or implied and assume no liability in connection with any use of this information.

We reserve right to revise this safety sheet from time to time.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

1. Product & Company Identification:

Product:	Potassium Chloride Solution Saturated with Silver Chloride
Manufacturer:	Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau
Telephone:	+49 (0) 9604 / 40 - 8988
Date of issue:	08.09.2014

Type: Potassium Chloride Solution with AgCl
Identity: Potassium Chloride Solution Saturated with Silver Chloride
Form/Aspect: KCl salts with trace AgCl dissolved in water
Use: Electrolyte Solution for electrodes with an Ag/AgCl reference

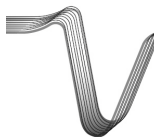
2. Ingredient Information:

Potassium Chloride 28.3% OSHA PEL/ACGIH TLV: N/A
Cas. No.: 7447-40-7
Molecular Formula: KCl
Silver Chloride 0.001%
Cas. No.: 7783-90-60
Molecular Formula: AgCl
Water Balance

*According to OSHA, this product should not be considered a hazardous material.

3. Physical/Chemical Characteristics:

Boiling Point: N/A
Vapor Density (Water): N/A
Melting Point: N/A
Appearance/Odor: Clear, odorless liquid
Water Solubility: 100% by weight
Specific Gravity (H₂O=1): 1.15
Evaporation Rate: N/A
Vapor Pressure: (mm Hg): N/A
Reactivity In Water: N/A



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

4. Fire And Explosion Hazard Data:

Flash Point: N/A
Unusual Fire & Explosion Hazards: None
Extinguishing Media: Any
Flammable Limits: LEL: N/A
UEL: N/A
Special Fire Fighting Procedures: N/A

5. Reactivity Data:

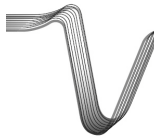
Stability: Stable
Hazardous Polymerization: Will Not Occur
Incompatibility: BrF₃
Hazardous Decomposition Or Byproducts: N/A
Conditions To Avoid: None known
Conditions To Avoid: None known

6. Health Hazard Data:

Exposure Limit: Potassium Chloride: Oral-Guinea Pig LD50: 2500 mg/kg
Route Of Entry: Inhalation: N/A
Skin: N/A
Ingestion: Yes
Carcinogenicity: NTP: N/A
IARC Monogr: N/A
OSHA Reg.: No
Health Hazards: None Known
Effects Of Overexposure: (See below)

Emergency & First Aid Procedures:

Oral: Large doses cause GI irritation, purging, weakness and circulatory problems. Contact a physician.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

7. Precautions For Safe Handling And Use:

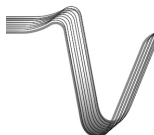
Spill Response:	Pick up and wash down drain with excess of water.
Waste Disposal:	Not regulated.
Precautions To Be Taken In Handling & Storage:	Store in cool, dry place.
Other Precautions:	N/A

8. Control Measures:

Respiratory Protection:	N/A
Protective Gloves:	Optional
Other Protective Equipment:	None Required
Ventilation:	None
Eye Protection:	Safety Glasses
Work/Hygienic Practices:	Wash hands thoroughly before eating, drinking or smoking.

Key: N/A = Not Applicable Or Not Available

N/D = Not Determined



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

1. Product & Company Identification:

Product:	Coin-type Manganese Dioxide Lithium Battery CR2032
Manufacturer:	Conrad Electronic SE. Klaus-Conrad-Str. 1, D-92240 Hirschau
Nominal voltage:	3 V
Telephone:	+49 (0) 9604 / 40 - 8988
Date of issue:	08.09.2014

These products are exempted from Material Safety data Sheet regulations. However, this manual provides you with referential information to safely use the products.

2. Composition, Information on Ingredients:

Ingredients	CAS#	PRTR	Weight/Content
Lithium metal (Li)	7439-93-2	Not regulated	0.060 g
Manganese dioxide (MnO ₂)	1313-13-9	1-311	20-40 wt%
Graphite (C)	7782-42-5	Not regulated	2-3 wt%
Dimethoxyethane (C ₄ H ₁₀ O ₂)	110-71-4	Not regulated	5-10 wt%
Propylene carbonate (C ₄ H ₆ O ₃)	108-32-7	Not regulated	

3. Summary of Danger and Toxicity:

Fatal danger and toxicity

No information available

Danger and toxicity

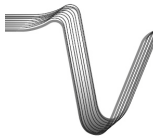
Chemical ingredient is hermetically sealed in a vessel, so the product is neither dangerous nor toxic as a cell. The cell shapes like a small coin, so be careful that particularly a little child may accidentally swallow it. If the lithium metal of contents touches the skin, a chemical burn is caused. In addition, the lithium metal is oxidized and creates corrosive lithium oxide. If reacting with water, lithium metal produces hydrogen gas that may fire as a combustible gas. If a cell burnt, generated steam may stimulate eyes, skin, and throat.

Effect to environment

No information available

Overview of prospective emergency

A cell may break or be shorted by an external mechanical or electrical stress.



Material Safety Data Sheet

4. First Aid Measures:

There is no problem in the normal state. But take the following measures when the contents have begun to leak by the destruction of the battery.

Inhalation

If a person inhaled steam, move to the place where air is fresh immediately. If he/her feels ill, immediately call a doctor for therapy and treatment.

Skin

If the content adheres to skin, immediately wash it with a large amount of clean water and soap promptly. If irritating, consult a doctor.

Eyes

If the content enters eyes, rinse eyes with a large amount of clean water for more than 15 minutes, and consult a doctor.

Ingestion

If a cell is swallowed, immediately call a doctor for therapy and treatment.

5. Fire Fighting Measures:

Fire extinguishers

CO₂, dry chemical

Specific fire fighting method

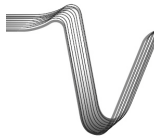
In the initial state of a fire, move cells/batteries from near the fire source, to a safe location. At that time, work at a windward location, as far as possible, and be sure to put on a protective breathing mask.

Protection of fire fighting personnel

Be wear protective breathing masks, gloves, glasses and helmet for the keeping safe. (Preferably, use a self-feeding type mask.)

6. Action upon Leakage and Removing Method:

A cell hermetically contains constituents in a vessel, so contents normally may not leak out. However, if the contents leaks because of a mechanical or electrical stress, scatter dry sand to absorb it, and collect the sand in a vessel. If lithium metal leaks, there is a firing potential because of a reaction with moisture in the atmosphere and reaction heat. At that time, be sure to put on a protective-breathing mask. (Preferably, use a self-feeding type mask.)



Material Safety Data Sheet

7. Handling and Storage:

Handling

Any leakage or obnoxious odor of a cell, it should be disposed. Never solder a cell body. Do not contact cell terminals between each other, or with another conductor. Neither throws into fire, decompose, heat, dent, deform, charge nor drop a battery. Do not dip a cell in water or seawater.

Storage

Store cells without direct sunlight, high temperature, high humidity, rain, dew, etc., and select a storage location with a temperature as low as possible (preferable temperature 20+/-15°C and relative humidity 70% or less). In addition, keep cells away from dangerous matter such as combustible or ignitable materials. Absolutely never place a cell in contact with a combustible or conductive substance. Prepare appropriate firefighting equipment.

Note

See handling and storing precautions described in the product catalog, specification, etc.

8. Prevention from Exposure:

Protection of respiratory organs

Not required in a normal operating state

Protection of eyes

Not required in a normal operating state

Other protective tools etc.

Not required in a normal operating state

9. Physical and Chemical Properties:

Shape:

Coin-shape. Contents are sealed in a stiff stainless steel vessel.

PH:

Not applicable because a cell is not soluble with water.

Boiling point/boiling range:

No information

Melting point:

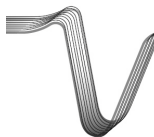
No information

Decomposition temperature:

No information

Flash point:

No information



Material Safety Data Sheet

10. Stability and Reactivity:

Conditions to be avoided

If a number of cells are mixed up without insulating terminals, they may short and possibly heat, break and ignite. When a cell is charged, possibly in bursting the electrolyte etc. Or, it may possibly burst or fire. If a cell is heated or thrown into fire, it may explode or fire with the electrolyte etc. bursting from inside of the cell. If decomposed, there is a possibility of overheating or fire due to short circuit, and ignition of some material around etc.

11. Information on Toxicity:

There is no toxicity because chemical substances are hermetically sealed in a metal vessel.

As a reference, chemical substances composing a cell are described below.

Lithium metal

Acute toxicity No appropriate report available
Local effect A skin contact may result in inflammation.

Manganese dioxide

Acute toxicity LDL0:45 mg/kg (Intravenous injection, rabbit)
 LD:422 mg/kg (Hypodermic injection, mouse)
Irritation Irritating eyes, nose, throat and skin.
Chronic toxicity If a person is exposed to powder for a long time or repeatedly, the lung and the nervous system may be affected, possibly causing bronchitis, pneumonia, nervous disease or mental disease.
Procreation toxicity TCL0:49mg/m³ (Inhalation, mouse)

Graphite

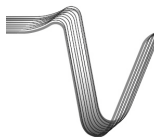
Chronic toxicity If inhaled for a long time without protective tools, local ventilation, etc., graphite lung may result.
Breathing toxicity If inhaled for a long time without protective tools, local ventilation, etc., graphite lung may result.

Dimethoxyethane

Irritation Irritating and possibly causing inflammation
Acute toxicity LD50:7kg/kg (Rat oral)
Chronic toxicity Long-term exposure may cause inflammation. If exposed further, liver or kidney may be troubled.
Teratogenicity Acknowledged to have Teratogenicity through experiments on animals.

Propylene carbonate

Irritation Irritating skin and eyes
Acute toxicity LD50:29kg/kg (Rat oral)



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

12. Ecological Information:

No information as batteries.

13. Disposal Precautions:

Disposal of the substance should be done according to the laws and regulations.

Although used cells can be discarded basically as "nonflammable refuse," some local governments sort and collect them at their own discretion. Therefore, observe instructions of the government you belong to, to dispose of the substance.

Keep the following discarding precautions:

- Even a used cell sometimes stores electric energy. Therefore, to prevent the battery from short-circuit, isolate cells from each other by a method such as taping +, - terminals of cells, or using the individual housing case of a cell, used when you bought the battery, and orderly encasing batteries in a box, then submit an application of disposal to the local government of your residence, using the designated form.
- Packing cells so that they are not shorted, and prevent the package from being wetted.
- If cells must be discarded in a country other than Japan, observe the instructions of the country and local government.

14. Transportation Precautions:

It is required to perform the confirmation such as laws and ordinances / the regulation about the transportation by shipper responsibility. After our product was delivered to a customer, if a customer transports a product as a shipper, it is necessary to confirm laws and ordinances / regulation with the customer. The following information is not things to guarantee with a thing to offer as reference information about the transportation.

The coin-type manganese dioxide lithium batteries are classified in UN recommendation as follows.

Proper Shipping Name/Description : LITHIUM METAL BATTERIES

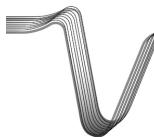
UN Number UN3090 (When cell/batteries contained in equipment and packed with equipment, it is UN3091)

Class or div. Class 9 (Miscellaneous Dangerous Goods)

Packing Group II

The other major transportation regulation is as follows.

Area	Method	Regulations
International	Air	ICAO-TI/IATA-DGR
International	Water	IMO-IMDG Code
U.S.A	Air, Rail, Highway, Water	US DOT-49 CFR
Europe	Rail, Highway	RID,ADR



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

The air transport of the lithium battery:

If all of following 7 requirements is satisfied, lithium metal cell/battery can be transported as no dangerous goods.

1. The lithium content of the lithium metal cell is 1g or less (battery: 2g or less).
2. Each cell/battery must meet requirements of the UN recommendation (Manual of Tests and Criteria, Part III, sub-section 38.3).
3. Package pass drop test (all courses) of 1.2m unless cell/batteries contained in equipment.
4. Each package must be labeled with a lithium battery handling label. (Each package containing more than four cells or two batteries installed in equipment must be labeled with a lithium battery handling label.)
5. Each consignment must mention the following contents in an air waybill.
 - (i)The package contains Lithium metal cell/battery, and is no dangerous goods.
 - (ii) The package must be handled with care and that a flammability hazard exists if the package is damaged.
 - (iii)Special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and telephone number for additional information.
6. Satisfying government escape clause, an operator escape clause. It is necessary confirmation and correspondence so that there is a setting case in a special provision by the government or an airline.
7. If a person transports cell/battery, there be weight of the package within 2.5kg. About the detailed information, please confirm the latest IATA-DRG (Packing Inspection 968,968,970)

Others instructions

Transportation regulation in USA:

Transport of primary lithium battery by passenger aircraft is forbidden in U.S.A. Transportation means other than a passenger aircraft (Cargo aircraft, land transportation, marine transportation)is possible. However, the following message must be indicated on the side of outer pack.

[PRIMARY LITHIUM BATTERIES — FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT] or [LITHIUM METAL BATTERIES — FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT]

- High-contrast character colors (example: black characters on yellow base) should be used.
- The height of a character is regulated depending on package mass.

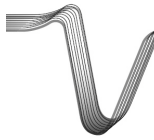
Total mass more than 30 kg : Minimum 12 mm

Total mass of 30 kg or less : Minimum 6 mm

About the detailed information, please confirm the latest USDOT-49CFR.

Storage/ Handling

Avoid high temperature, high humidity and condensation. Store batteries at room temperature (45°C or less: recommendation is 20+/-15°C) with minimum temperature variations and a RH of not more than 70%. Carefully handle containers, and do not strike them so strongly as denting a cell. Packing cells and prevent them from short-circuit. Also fix cells so as not to result in a load shift during transportation.



Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

Item no. 101137

Material Safety Data Sheet

The shipper should transport a lithium battery after having confirmed the latest transportation regulation.

<Related regulation, Issued documents>

- 1) IATA Dangerous Goods Regulations 53rd Edition
- 2) ICAO Technical Instructions for the safe transport of dangerous goods by air. 2011-2012 Edition
- 3) IMO International Maritime Dangerous Goods Code 2010 Edition(Incorporating Amendment 35-10)
- 4) U.S. DOT 49CFR

15. Applicable Laws and Regulations:

The laws and ordinances about the battery obey new laws and ordinances set in each country.

16. Other Information:

Contents of this manual have been edited based on data, information, etc. that Toshiba could acquire when editing the manual, so the manual may be revised by new information, if any. Contents of the manual assume normal handling of batteries, and are provided as referential information. Therefore, the manual provides no warranties. The customer is requested to use batteries on the basis of appropriate measures established depending on individual conditions, application and operation. Any numerals such as contents and concentration ranges, and others are not guaranteed.