VOLTCRAFT®

**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**

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

## 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:** Dring lots of water. Do not induse 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 docomposition 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.

**Cleanup technique:**

Absorb spilled liquuid with non-reactive sorbent material. Sweep up material. Place material in a plastic bag. Mark bag „Non-hazardous trash“ and dispose of as normal refues. 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.**

## 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 a 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 respiratiors 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 vonenient, sanitary storage areas.

**Protective clothing/equipment:**

Wear chemically protective gloves, boots, aprons, and gauntlets to prevent rpolonged 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.

## 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 (H2O=1, at 4°C: | ~1 |
| pH: | 7.00@25°C |
| Water solubility: | miscible |
| Other solubil.ities: | not determinded |
| Boiling point: | 100°C |
| Freezing/melding point: | NDA |
| Viscosity: | NDA |
| Refractive index: | NDA |
| Surface tension: | NDA |
| %volatile: | not volatile |
| Evaporation rate: | NDA |

## 10. Stability and Reactivity:

**Stability:**

Hydrion 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, hypochlorus acid, hypochlorites, cyanides or sulfides.

## 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 train. 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 locarl environmental regulatiors for more information.

## 14. Transport Information:

**DOT Transportation data (49 CFR 172.101):**

Not regulated at this time.

## 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 herin and does not relate to use in combination with any other material that is not supplied by us as buffer salt.

The statements contained herin 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.

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**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**

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

## 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:** Dring lots of water. Do not induse 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 docomposition 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 propared buffer solution is spilled neutralize and mop area.

**Small spills:**

Wipe and clean area.

**Containment:**

For large spills, dike far agead 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).

## 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 a 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 respiratiors 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 vonenient, sanitary storage areas.

**Protective clothing/equipment:**

Wear chemically protective gloves, boots, aprons, and gauntlets to prevent rpolonged 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.

## 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 (H2O=1, at 4°C: | ~1 |
| pH: | 4.00@25°C |
| Water solubility: | miscible |
| Other solubil.ities: | not determinded |
| Boiling point: | 100°C |
| Freezing/melding point: | NDA |
| Viscosity: | NDA |
| Refractive index: | NDA |
| Surface tension: | NDA |
| %volatile: | not volatile |
| Evaporation rate: | NDA |

## 10. Stability and Reactivity:

**Stability:**

Hydrion 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, hypochlorus 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 locarl environmental regulatiors for more information.

## 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 herin and does not relate to use in combination with any other material that is not supplied by us as buffer salt.

The statements contained herin 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.

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**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 (H20=1): 1.15

Evaporation Rate: N/A

Vapor Pressure: (mm Hg): N/A

Reactivity In Water: N/A

## 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: | $BrF_3$ |
| 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.

# 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

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**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 form Material Safety data Sheet regulations. However, this manual provides you with referential information to safety 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 ($Mn0_2$) | 1313-13-9 | 1-311 | 20-40 wt% |
| Graphite (C) | 7782-42-5 | Not regulated | 2-3 wt% |
| Dimethoxyethane ($C_4H_{10}0_2$) | 110-71-4 | Not regulated | 5-10 wt% |
| Propylene carbonate ($C_4H_6O_3$) | 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.

## 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.)

## 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

## 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) |

## 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/butteries 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 |

# 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/butteries 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.

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.