

## PRODUCT SAFETY DATA SHEET

### 1. Product and Company identification

Product Category : Manganese Dioxide Lithium Primary Battery  
 Product name : See Table 1  
 Nominal Voltage : 3 V (6 V for model 2CR-1/3N in the Table 1)  
 (Table 1)

Type	Lithium (gr.)	Type	Lithium (gr.)
CR1216	0.01	CR2032	0.07
CR1220	0.02	CR2430	0.09
CR1616	0.02	CR2450	0.18
CR1620	0.03	CR2477	0.28
CR2016	0.03	CR-1/3N	0.06
CR2025	0.05	2CR-1/3N	0.12

Supplier's Name : FDK CORPORATION  
 Supplier's Address : 5-36-11, Shimbashi, Minato-Ku, Tokyo, 105-8677, Japan  
 Telephone +81-3-3434-1279  
 Emergency Contact : CHEMTREC at (800)424-9300

Note : The battery is neither substance nor mixture but product and having no risk to life and health under normal use or transportation because ingredients of battery is not leaked out by virtue of hermetical sealing with metal case.

This MSDS notify possible risk of our battery under abnormal use but mainly aim to provide information

### 2. Hazards identification

The important hazards and adverse effects of the chemical product	No information available
Chemical product - specific hazards	No information available
Outline of an anticipated emergency	Chemical contents are sealed in metal can. Therefore, risk of exposure never occurs unless battery is mechanically or electrically abused. Risk of explosion by fire is anticipated if batteries are disposed of in fire or heated above 100 degree Celsius. Stacking or jumbling of batteries may cause external short circuits, heat generation, in some case, allowing fire or explosion.

Note) Our battery is not classified in accordance with the GHS classification.

### 3. Composition/ information on Ingredients

Material	CAS No.	Contents
Manganese Dioxide	1313-13-9	10 ~ 40 wt%
Lithium metal	7439-93-2	1 ~ 5 wt%
Electrolyte [Mixture of organic solvent]	—	2 ~ 20 wt%

Note) Electrolyte is mixture of organic solvent and does not include substances available for classification of GHS.

#### 4. First-aid measures

Chemical contents are sealed in metal can. Therefore, risk of exposure never occurs unless battery is mechanically or electrically abused. First aid shown below may need to be taken in such abnormal case only.

Inhalation :	Provide fresh air. Refer for medical attention.
Skin contact :	Wash the contact areas off immediately with plenty of water and soap. If appropriate procedure are not taken, this may cause sores on the skin
Eyes contact :	Flush the eyes with plenty of water for at least 15 minutes immediately, without rubbing. Take a medical treatment. If appropriate procedures are not taken, this may cause an eye irritation
Swallowing :	In case of swallowed battery, immediately refer for medical attention.

#### 5. Fire-fighting measures

Fire extinguishing agent: Dry chemical, alcohol-resistant foam, powder, atomized water, carbon dioxide and dry sand are effective.

Extinguishing method: Escape batteries to safe place prevent from ignition by spreading fire. Because packaging material of battery is paper, use water extinguisher, CO2 extinguisher or powder extinguisher as normal extinguisher. Since vapor, generated from burning batteries may make eyes, nose and throat irritate, be sure to extinguish the fire on the windward side. Wear the respiratory protection equipment in some cases.

Special equipment for the protection of firefighters

Hand protection: A pair of flame-proof groves

Eye protection: Face mask

Protective wear of skin and/or body: Protective closing

#### 6. Accidental release measures

Chemical contents are sealed in metal can. But if the battery is mechanically or electrically abused, contents may leak out. In such case, take action as showing below.

Personal precautions : Temporary inhalation of odor and attaching of electrolyte to skin does not cause serious health hazard. Be sure the ventilation and washing out of electrolyte quickly.

Environmental precautions : Clean up it quickly. Specific environmental precaution is not necessary.

Method and materials for containment and methods and materials for cleaning up: Contain and collect spillage and place in container for disposal according to local regulations (see Section 13).

Prevention of secondary hazards : If batteries catch fire, separate other batteries as well other inflammable materials from flamed batteries quickly in order to prevent spreading fire.

## 7. Handling and storing

Transportation and freight handling:	Make sure compliance with packing instruction of transportation regulation in case of arrangement of original packing to small package, incorporation batteries with appliance or set in appliance. Prevent wetting of packing by rain or dew condensation. Do not place packing near source of heat. Do not drop packing from more than 1m height and do not press packing allow deforming it.
Handling :	Do not charge, short-circuit, disassemble, deform, heat above 100°C or incinerate. Do not pile up or mingle batteries with each other. Do not place battery on metal case, metal plate or antistatic material. In case of multi cell application, replace all batteries to new at once when replacing used batteries.
Storage :	Be sure to store batteries in well-ventilated, dry and cool conditions. Keep away from water, rain, snow, frost or dew condensation. Do not store batteries near source of heat or nozzle of hot air. Do not store batteries in direct sunshine. Take care not to get wet packing by dew condensation when packing is removed from cold to warm and humid condition. Enough number of fire fighting apparatuses should be installed in warehouse.

## 8. Exposure controls and personal protection

There is no need of personal protective equipment on regular handling and storage. In the event, however, a large amount of electrolyte should be released by mechanical or electrical abuse, use the protections as shown below.

Respiratory protection: Mask (with a filter preferably)  
 Hand protection: Synthetic rubber gloves  
 Eye protection: Goggles or glasses

## 9. Physical and chemical properties

State: Solid

Shape: Coin-type

Since battery is not chemical product, other than above information is not applicable.

## 10. Stability and reactivity

Stability: Stable on regular handling

Conditions to avoid: External short circuit of battery, deformation by crush, exposure at high temperature of more than 100 degree C (may cause heat generation and ignition), direct sunlight, high humidity

Materials to avoid: Water, a chain, and a piece of metal that causes short circuit.

Hazardous decomposition product: Emitted acrid or poisonous gases in fire.

## 11. Toxicological information

Since chemicals are contained in a sealed can, there are no hazards.  
Toxicological information of main components of battery is shown below as reference.

## Manganese Dioxide

Acute toxicity: rabbit \*<sup>1</sup>:  $LDL_0$ (blue pipe)=45mg/kg, mouse\*<sup>2</sup>:  $LD_{50}$ (subcutaneous)=422mg/kg

Local effects: Stimulus to an eye, a nose, a throat, and a skin

Chronic toxicity or long-term toxicity: Inhalation of powder dust or fume for a long time (at least 3 months) may cause specific central nerve symptom like Parkinson's disease.

Reproduction toxicity: Mouse\*<sup>3</sup> inhalation  $TCL_0$ =49mg/m<sup>3</sup>

## Lithium metal

Acute toxicity: No information in a metal state

Local effects: Touching on a skin or an eye causes thermal burn and alkaline chemical burn.

## Electrolyte

Acute toxicity: No information at present

Local effects: Slight stimulus to an eye

## 12. Ecological information

Anticipated behavior of chemical product in environment/possible environmental impact/ecotoxicity	No information available
Persistence and degradability	No information available
Bioaccumulative potential	No information available
Mobility in soil	No information available

## 13. Disposal considerations

Dispose of batteries in accordance with applicable federal, state and local regulations.

For safety precaution, battery should be insulated in proper manner; covering both terminals by tape, wrapping of battery in insulative bag or packing battery in original package is recommended in order to prevent ignition or explosion due to short-circuit.

## 14. Transportation Information

Lithium metal battery is Dangerous Goods (class 9), having certain UN number as showing below table, the UN number of which is listed in the Dangerous Goods List. In case content of Lithium or Lithium alloy is not over 1g (Battery pack: 2g), such battery (and battery pack) is permitted to transport by Special provision 188 in accordance with United Nations Recommendation on the Transport of Dangerous Goods.

Since weight of Lithium of our battery is not over the aforesaid weight, it is applicable to Special provision 188 of Non-dangerous goods. Our battery also complies with the requirement of UN Manual of Test and Criteria, Part 3, subsection 38.3 and IATA Packing instruction PI968 – Section II, so our battery is permitted to transport by air as Non-dangerous Goods.

UN No.	Proper Shipping Name/Description
3090	Lithium metal batteries
3091	Lithium metal batteries contained in equipment
3091	Lithium metal batteries packed with equipment

Related regulations: Following regulations shall be cited and considered.

Transportations	Related organization / Issue documents
Air transport (by airplane)	ICAO (International Civil Aviation Organization) / TI (Technical Instruction) IATA (International Air Transport Association) / DGR (Dangerous Goods Regulations) *4
Maritime transport (by ship)	IMO (International Maritime Organization) / IMDG Code (International Maritime Dangerous Goods Code) *5
Land transport (Intra-European)	RID (International Carriage of Dangerous Goods by Rail)、ADR (International Carriage of Dangerous Goods by Road)
USA / UN	USDOT (US Department of Transportation) / DOT 49 CFR (US law) UN: Recommendations on the transport of dangerous goods: Manual of Tests and Criteria 5th revised edition [ST/SG/AC.10/11/Rev.5]: Part 3, Subsection 38.3

## 15. Regulatory information

Environment-related law of batteries; EU nations have applicable law in accordance with Directive 2006/66/EC and other some countries, China, Korea, Brazil, some provinces of USA and Canada or so have similar law.

## 16. Other information

### Reference

- Federal Resister / Vol.65, No.174 / Thursday, September 7, 2000 / Notices
- IATA Dangerous Goods Regulations, latest edition \*4

### Notes on this sheet

- \*1 Journal of the D.I Mendeleeva All-Union Chemical Society.  
(V/O Mezhdunarodnaya knija, 113095 Moscow, USSR) V.5-1960
- \*2 Merck Index; an Encyclopedia of Chemicals, Drugs, and Biologicals, 11<sup>th</sup> ed.,  
Rahway, NJ 07065, Merck & Co., Inc. 1898
- \*3 Federation of American Societies for Experimental Biology (Bethesda, MD) V.1-46, 1942-87
- \*4 Dangerous Goods Regulations – 53<sup>rd</sup> Edition Effective 1 January 2012: International Air Transport Association (IATA)
- \*5 IMDG Code – 2008 Edition: International Maritime Organization (IMO)

The information and the recommendations set forth are made in good faith and believed to be accurate until validated date shown below.

The present file refers to normal use of the product in question. FDK Corp. makes no warranty expressed or implied.

Validated date: December 31, 2012



Issued date: January 1, 2016

## SAFETY DATA SHEET (SDS)

### 1. Product and Company identification

Product Category : Manganese Dioxide Primary Lithium Battery  
Nominal Voltage : 3 V (6 V for model 2CR-1/3N)

Product name

Type	Lithium (g)
CR1216	0.01
CR1220	0.02
CR1616	0.02
CR1620	0.03
CR1632	0.04
CR2016	0.03
CR2025	0.05

Type	Lithium (g)
CR2032	0.07
CR2430	0.09
CR2450	0.18
CR2477	0.28
CR-1/3N	0.06
2CR-1/3N	0.12

Supplier's Name : FDK CORPORATION  
Supplier's Address : 1-6-41, Konan, Minato-ku, Tokyo 108-8212 Japan  
Telephone +81-3-5715-7435

Emergency Contact : CHEMTREC at (800)424-9300

Note: SDS is not applicable to the product hermetically sealed as dry battery. The battery has no risk to life and health under normal use or transportation because ingredients of battery are not leaked out by virtue of hermetical sealing with metal case.

This SDS notify possible risk of our battery under abnormal use but mainly aim to provide information about ingredients, notification of handling and transportation regulations as a useful reference.

### 2. Hazards identification

The important hazards and adverse effects of the chemical product	No information available
Chemical product - specific hazards	No information available
Outline of an anticipated emergency	Chemical contents are sealed in metal can. Therefore, risk of exposure never occurs unless battery is mechanically or electrically abused. Risk of explosion by fire is anticipated if batteries are disposed of in fire or heated above 100 degree Celsius. Stacking or jumbling of batteries may cause external short circuits, heat generation, in some case, allowing fire or explosion.

Note) Our battery is not classified in accordance with the GHS classification.

### 3. Principal Composition/ information on Ingredients

Part	Material	CAS No.	Contents
Positive electrode	Manganese Dioxide	1313-13-9	10 ~ 40 wt%
Negative electrode	Lithium metal	7439-93-2	1 ~ 5 wt%
Electrolyte	Lithium perchlorate (*)	7791-03-9	0 ~ 1.5 wt%
	1,2-Dimethoxyethane	110-71-4	1 ~ 6 wt%
	Mixture of organic solvent	N/A	2 ~ 10 wt%

(\*)Not contain in CR-1/3N and 2CR-1/3N

4. First-aid measures

Inhalation	If ingredient leaked out from inside of a battery and if inhaled it, move to a place where fresh air is provided. Refer for medical attention.
Skin contact	If ingredient leaked out from inside of a battery and stuck on skin, wash the contact areas off immediately with plenty of water and soap. If appropriate procedures are not taken, this may cause sores on the skin. Refer for medical attention.
Eyes contact	If ingredient leaked out from inside of a battery and came into eyes, flush the eyes with plenty of water for at least 15 minutes immediately without rubbing. Take a medical treatment. If appropriate procedures are not taken, this may cause an eye irritation.
Swallowing	In case of swallowing of battery, immediately refer for medical attention.

5. Fire-fighting measures

Fire extinguishing agent:

Dry chemical, alcohol-resistant foam, powder, atomized water, carbon dioxide and dry sand are effective.

Extinguishing method:

Escape batteries to safe place prevent from ignition by spreading fire.

Because packaging material of battery is paper, use water extinguisher, CO2 extinguisher or powder extinguisher as normal extinguisher.

Since vapor, generated from burning batteries may make eyes, nose and throat irritate, be sure to extinguish the fire on the windward side. Wear the respiratory protection equipment in some cases.

6. Accidental release measures

Chemical contents are sealed in metal can. But if the battery is mechanically or electrically abused, contents may leak out. In such case, take action as showing below.

Personal precautions: Temporary inhalation of odor and attaching of electrolyte to skin does not cause serious health hazard. Be sure the ventilation and washing out of electrolyte quickly.

Environmental precautions: Clean up it quickly. Specific environmental precaution is not necessary.

Method and materials for containment and methods and materials for cleaning up:

Contain and collect spillage and place in container for disposal according to local regulations.

7. Handling and storing

Handling	Do not charge, short-circuit, disassemble, deform, heat above 100°C or incinerate. Do not pile up or mingle batteries with each other. Do not place battery on metal case, metal plate or antistatic material. In case of multi cell application, replace all batteries to new at once when replacing used batteries.
Storage	Be sure to store batteries in well-ventilated, dry and cool conditions. Keep away from water, rain, snow, frost or dew condensation. Do not store batteries near source of heat or nozzle of hot air. Do not store batteries in direct sunshine. Take care not to get wet packing by dew condensation when packing is removed from cold to warm and humid condition. Enough number of fire fighting apparatuses should be installed in warehouse.

8. Exposure controls and personal protection

There is no need of personal protective equipment on regular handling and storage. In the event, however, a large amount of electrolyte should be released by mechanical or electrical abuse, use the protections as shown below.

Respiratory protection : Mask (with a filter preferably)

Hand protection : Synthetic rubber gloves

Eye protection : Goggles or glasses

9. Physical and chemical properties

State : Solid  
Shape : Coin-type

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10. Stability and reactivity

Stability: Stable on regular handling

Conditions to avoid: External short circuit of battery, deformation by crush, exposure at high temperature of more than 100 degree C (may cause heat generation and ignition), direct sunlight, high humidity

Materials to avoid: Substances that cause short circuit.

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11. Toxicological information

Since chemicals are contained in a sealed can, there are no hazards.

Toxicological information of main components of battery is shown below as reference.

Manganese Dioxide

Acute toxicity: rabbit :  $LDL_0$ (blue pipe)=45mg/kg, mouse:  $LD_{50}$ (subcutaneous)=422mg/kg

Local effects: Stimulus to an eye, a nose, a throat, and a skin

Chronic toxicity or long-term toxicity: Inhalation of powder dust or fume for a long time (at least 3 months) may cause specific central nerve symptom like Parkinson's disease.

Lithium metal

Acute toxicity: No information in a metal state

Local effects: Touching on a skin or an eye causes thermal burn and alkaline chemical burn.

Lithium perchlorate

Acute toxicity: No information at present

Local effects: Slight stimulus to an eye and skin

1,2-Dimethoxyethane

Acute toxicity: mouse:  $LD_{50}$ (subcutaneous)=2.5mg/kg

Local effects: Slight stimulus to skin

Mixture of organic solvent

Acute toxicity: No information at present

Local effects: Slight stimulus to an eye

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12. Ecological information

Persistence and degradability	No information available
Mobility in soil	No information available

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13. Disposal considerations

Dispose of batteries in accordance with applicable federal, state and local regulations.

For safety precaution, battery should be insulated in proper manner; covering both terminals by tape, wrapping of battery in insulative bag or packing battery in original package is recommended in order to prevent ignition or explosion due to short-circuit.

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14. Transportation Information

Lithium metal cells and batteries are classified as Class 9 Dangerous Goods in the United Nations Recommendation, and given UN numbers as shown in the below table. In case of transport of lithium metal cells and batteries, compliance with all the relevant UN regulations in addition to the requirements of United Nations Recommendation is required.

Our battery (listed on section 1) and its shipping package complies with the requirement of UN Manual of Test and Criteria, Part III, subsection 38.3 as well as the requirements described below, so it is permitted to transport.

< Air Transport >

Our battery is applicable to IATA Dangerous Goods Regulations (IATA-DGR) Packing Instruction 968 section II because it corresponds to the cell (or battery) -lithium content is less than 0.3g. Our battery and its shipping



package is permitted to transport as Exempted Dangerous Goods when it complies with all requirements of the transport conditions for Section II.

Lithium metal batteries transported as cargo will be restricted to cargo aircraft only. Our products can be transported by cargo aircraft only since our products are classified into lithium metal batteries. Such lithium metal batteries contained in or packed with equipment are exempted

<Sea Transport>

Our battery is applicable to the International Maritime Dangerous Goods Code (IMDG-Code) Special provision 188 because it corresponds to either case that the cell – lithium content is less than 1g or the battery – lithium content is less than 2g, so it is permitted to transport as Exempted Dangerous Goods when it complies with all requirements of the transport conditions.

UN No.	Packing Instruction	Proper Shipping Name/Description
3090	968	Lithium metal batteries
3091	969	Lithium metal batteries packed with equipment
3091	970	Lithium metal batteries contained in equipment

Related regulations: Following regulations shall be cited and considered.

Transportations	Related organization / Issue documents
Air transport (by airplane)	ICAO (International Civil Aviation Organization) / TI (Technical Instruction) IATA (International Air Transport Association) / DGR (Dangerous Goods Regulations) *1
Maritime transport (by ship)	IMO (International Maritime Organization) / IMDG Code (International Maritime Dangerous Goods Code) *2
Land transport (Intra-European)	RID (International Carriage of Dangerous Goods by Rail) , ADR (International Carriage of Dangerous Goods by Road)
USA / UN	USDOT (US Department of Transportation) / DOT 49 CFR (US law) UN: Recommendations on the transport of dangerous goods: Manual of Tests and Criteria 5th revised edition Amendment 2 [ST/SG/AC.10/11/Rev.5/Amend.2]: Part III, Subsection 38.3

15. Applicable legislation

- EU Directive 2006/66/EC
- CA Lithium Perchlorate Regulation

16. Other information

Reference

- IATA Dangerous Goods Regulations, latest edition \*1

Notes on this sheet

- \*1 Dangerous Goods Regulations – 57<sup>th</sup> Edition Effective 1 January 2016: International Air Transport Association (IATA)
- \*2 IMDG Code – 2012 Edition: International Maritime Organization (IMO)

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