Issued date: Jan 2, 2020

Material Safety Data Sheet(MSDS)

1. Product and Company identification

Product Category: Lithium Manganese Dioxide Primary Battery, Nonrechargeable

Nominal Voltage: 3 V

Product name:

Type	Lithium (gr.)
CR2	0.33

Supplier's Name: Titanium Innovations Inc.

Supplier's Address: 50 School House Rd, Unit 2, Old Saybrook, CT 06475

Telephone: (860) 581-4540

Emergency Contact: (860) 581-4540

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 sheet notifies 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

GHS Classification: Not applicable

Toxicity : Vapor generated from burning batteries, may irritate eyes, skin and throat.

Hazard : Electrolyte and lithium metal are inflammable.
Risk of explosion by fire if batteries are disposed in fire or heated above 100°C.
Stacking or jumbling batteries may cause external short circuits, heat generation, fire or explosion.

3. Composition/ information on Ingredients

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Active material:			
Manganese Dioxide (CAS Number:1313-13-9)	5 mg Mn/m^3 Ceiling	5 mg Mn/m^3	30.0-39.0
Lithium Metal (CAS Number:7439-93-2)	Not established	Not established	2.0-3.5
Lithium Perchlorate (CAS Number:7791-03-9)	Not established	Not established	1.0-2.5
Lithium Oxalyldifluroborate (CAS Number:409071-16-5)			

Propylene Carbonate(PC) (CAS Number:108-32-7)	Not established	Not established	10.0-12.0
Dimethoxyethane(DME) (CAS Number:110-71-4)	Not established	Not established	
Water	/	/	＜0.01
Inert material:			
Acetylene black (CAS Number: 1333-86-4)	3.5 mg/m^3 TWA(as carbon black)	3.5 mg/m^3 TWA(as carbon black)	2.5-3.0
Graphite (CAS Number: 7782-42-5)	5 mg/m3 TWA (respirable fraction) 15 mg/m3 TWA (total dust)	2 mg/m3 TWA (respirable fraction)	0-1.0
Adhesive (CAS Number:9002-84-0)	Not established	Not established	1.5-2.5
polypropylene (CAS Number:9003-07-0)	Not established	Not established	0.4-0.8
Iron(Fe)	/	/	30.0-35.0
Nickel-plate (CAS Number:7440-02-0)	1mg[Ni]/m^3	0.05mg/m^3[Ni]	＜0.2
Aluminium(Al) (CAS Number:7429-90-5)	10mg/m^3(dust)	5mg/m^3(smog)	4.0-5.5
Polyvinyl chloride(PVC) (CAS Number:9002-86-2)	Not established	Not established	2.0-4.0
Heavy metal:			
Hydrargyrum(Hg) (CAS Number:7439-97-6)	0.1mg/m^3	0.0025mg[Hg]/m^3	＜0.0001
Lead(Pb) (CAS Number:7439-92-1)	Not established	0.05mg/m^3	＜0.0001
Cadmium(Cd) (CAS Number:7440-43-9)	Not established	0.01mg/m^3	＜0.0002

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, CO_2 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 it up 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℃ or incinerate. Do not pile up or mingle batteries with each other. Handling 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	: Cylindrical

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

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 *[1]: LDL_0 (blue pipe) = 45mg/kg, mouse*[2]:$LD5_0$ (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*[3] inhalation TCL_0=49mg/m^3

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

Persistence and degradability	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

During the transportation of a large amount of batteries by ship, trailer or railway, do not leave them in the places of high temperatures and do not allow them to be exposed to condensation.

During the transportation do not allow packages to be dropped or damaged.

Proper shipping Name: Lithium metal batteries

UN Number, UN Class: UN3090, Class9 (for the Air transport by PI968 Section IA or IB)
: Exemption (for the Marine transport and the Air transport by Section II of PI968, 969, or 970)
: Even though the cells are classified as lithium metal batteries (UN3090 or 3091), they are not subject to some requirements of Dangerous Goods Regulations because they meet the following:
1. For cells, the lithium content is not more than 1g;
2. Each cell is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, PartIII, sub-section 38.3.
3. Each cell is manufactured in ISO9001 certified factory.

Please refer to the following reference information about concrete ways of transportation. Actual content of packaging label and shipping documents varies by shipping companies. Make sure to confirm in advance with your shipping company.

Information of reference

	Reference (Reference number)	Packing Instruction(PI)/ Special provision(SP)	Note
Air transport	IATA DGR	PI 968 Section A	Cells, Cargo Aircraft only; Net quantity per package Max. 35kg
		PI 968 Section B	Cells, Cargo Aircraft only; net quantity

			per package Max. 2.5kg
		PI 968 Section	Cells, on Cargo Aircraft only, not more than one package in any single consignment. Maximum number of cells per package; 8 cells
		PI 969 Section	Cells packed with equipment
		PI 970 Section	Cells contained in equipment
Marine transport	IMDG Code	SP 188	

15. Regulatory information

・IATA Dangerous Goods Regulations 61th Edition,2020 (IATA DGR)

・IMO International Maritime Dangerous Goods Code 2016 and 2018 Edition (IMDG Code)

・UN Recommendations on the Transportation of Dangerous Goods, Model Regulations

・UN Recommendations on the Transportation of Dangerous Goods, Manual of Tests and Criteria

・EU Battery Directive（2006/66/EC, 2013/56/EU)

・Regulation (EC) No. 1907/2006 on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

・State of California Regulations - Best management practices for Perchlorate Materials.

・Act on Preventing Environmental Pollution of Mercury(Japan).

16. Other information

This MSDS is provided to customers as reference information in order to handle batteries safely. It is necessary for the customer to take appropriate measures depending on the actual situation such as the individual handling, based on this information.

(END)