Material Safety Data Sheet

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name: DURACELL ALKALINE BATTERIES
Product Identification: Alkaline Manganese Dioxide Cells –
Duracell Designations: 7K67; MN1203; MN1300; MN1400; MN1500; MN2400; MN1604; MN908; MN918; MN9100; MX1604; MX2500; MX1300; MX1400; MX1500; MX2400

Product Use: Energy Source
MSDS Date of Preparation: August 24, 2009

Company Identification

US Office
Duracell, a division of P&G
Berkshire Corporate Park
14 Research Drive
Bethel, CT USA 06401
(203) 796-4000

Canadian Office
Duracell, a division of P&G
4711 Yonge Street
Toronto, Ontario
Canada M2N 6K8
(416) 730-4711

Emergency Phone Number: INFOTRAC Emergency Response Hotline 1-800-535-5053 (US & Canada)

SECTION 2: HAZARDS IDENTIFICATION

Physical Appearance: Copper top battery.

EMERGENCY OVERVIEW

CAUTION: May explode or leak, and cause burn injury, if recharged, disposed of in fire, mixed with a different battery type, inserted backwards or disassembled. Replace all used batteries at the same time. Do not carry batteries loose in your pocket or purse. Do not remove the battery label.

Potential Health Effects:

The chemicals and metals in this product are contained in a sealed can. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused. Damaged battery will release concentrated potassium hydroxide, which is caustic. Anticipated potential leakage of potassium hydroxide is 2 to 20 mL, depending on battery size.

Eye Contact: Contact with battery contents may cause severe irritation and burns. Eye damage is possible.

Skin Contact: Contact with battery contents may cause severe irritation and burns.

Inhalation: Inhalation of vapors or fumes released due to heat or a large number of leaking batteries may cause respiratory and eye irritation.

Ingestion: Swallowing is not anticipated due to battery size. Choking may occur if smaller AAA batteries are swallowed. Ingestion of battery contents (from a leaking battery) may cause mouth, throat and intestinal burns and damage.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS Number	Amount
Manganese Dioxide	1313-13-9	35-40%
Zinc	7440-66-6	10-25%
Potassium Hydroxide (35%)	1310-58-3	5-10%
Graphite (natural or synthetic)	7782-42-5, 7440-44-0	1-5%

SECTION 4: FIRST AID MEASURES

Eye Contact: If battery is leaking and material contacts the eye, flush thoroughly with copious amounts of running water for 30 minutes. Seek immediate medical attention.

Skin Contact: If battery is leaking and material contacts the skin, remove any contaminated clothing and flush exposed skin with copious amounts of running water for at least 15 minutes. If irritation, injury or pain persists, seek medical attention.

Inhaled: If battery is leaking, contents may be irritating to respiratory passages. Move to fresh air. If irritation persists, seek medical attention.

Swallowed: If battery contents are swallowed, do not induce vomiting. If the victim is alert, have them rinse their mouth are the surrounding skin with water for at least 15 minutes. Seek immediate medical attention.

Note: This MSDS does not include or address the small button cell batteries which can be ingested.

SECTION 5: FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Batteries may burst and release hazardous decomposition products when exposed to a fire situation.

Extinguishing Media: Use any extinguishing media that is appropriate for the surrounding fire.

Special Fire Fighting Procedures: Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing. Fight fire from a distance or protected area. Cool fire exposed batteries to prevent rupture. Use caution when handling fire-exposed containers (containers may rocket or explode in heat of fire).

Hazardous Combustion Products: Thermal degradation may produce hazardous fumes of zinc and manganese; hydrogen gas, caustic vapors of potassium hydroxide and other toxic by-products.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Notify safety personnel of large spills. Caustic potassium hydroxide may be released from leaking or ruptured batteries. Clean-up personnel should wear appropriate protective clothing to avoid eye and skin contact and inhalation of vapors or fumes. Increase ventilation. Carefully collect batteries and place in an appropriate container for disposal.

SECTION 7: HANDLING AND STORAGE

Avoid mechanical or electrical abuse. DO NOT short circuit or install incorrectly. Batteries may explode, pyrolize or vent if disassembled, crushed, recharged or exposed to high temperatures. Install batteries in accordance with equipment instructions. Do not mix battery systems, such as alkaline and zinc carbon, in the same equipment. Replace all batteries in equipment at the same time. Do not carry batteries loose in a pocket or bag. Do not remove battery tester or battery label.

Storage: Store batteries in a dry place at normal room temperature. Do not refrigerate – this will not make them last longer.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

The following occupational exposure limits are provided for informational purposes. No exposure to the battery components should occur during normal consumer use.

Chemical Name	Exposure Limits
Manganese Dioxide	5 mg/m3 Ceiling OSHA PEL 0.2 mg/m3 TWA ACGIH TLV
Zinc	None established for zinc metal
Potassium Hydroxide	2 mg/m3 Ceiling ACGIH TLV
Graphite (natural-non-fibrous)	15 mppcf TWA OSHA PEL 2 mg/m3 TWA (respirable dust) ACGIH TLV
Graphite (synthetic non-fibrous)	5 mg/m3 TWA (respirable dust), 15 mg/m3 TWA (total dust) OSHA PEL 2 mg/m3 TWA (respirable dust) ACGIH TLV

Ventilation: No special ventilation is needed for normal use.

Respiratory Protection: None required for normal use.

Skin Protection: None required for normal use. Use neoprene, rubber or latex gloves when handling leaking batteries.

Eye Protection: None required for normal use. Wear safety goggles when handling leaking batteries.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Copper top battery.
Specific Gravity: Not applicable
Water Solubility: Insoluble
Vapor Pressure: Not applicable
Vapor Density: Not applicable
Boiling Point: Not applicable
Melting Point: Not applicable
Flash Point: Not applicable
Autoignition Point: Not applicable

SECTION 10: STABILITY AND REACTIVITY

Stability: This product is stable.

Incompatibility/Conditions to Avoid: Contents are incompatible with strong oxidizing agents. Do not heat, crush, disassemble, short circuit or recharge.

Hazardous Decomposition Products: Thermal decomposition may produce hazardous fumes of zinc and manganese; caustic vapors of potassium hydroxide and other toxic by-products.

Hazardous Polymerization: Will not occur

SECTION 11: TOXICOLOGICAL INFORMATION

Acute Toxicity Data:
Manganese Dioxide: LD50 oral rat >3478 mg/kg
Potassium Hydroxide: LD50 oral rat 273 mg/kg

Chronic Effects: The chemicals in this product are contained in a sealed can and exposure does not occur during normal handling and use. No chronic effects would be expected from handling a leaking battery.

Target Organs: Skin, eyes and respiratory system.

Carcinogenicity: None of the components of this product are listed as carcinogens by ACGIH, IARC, NTP or OSHA.

SECTION 12: ECOLOGICAL INFORMATION

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

SECTION 13: DISPOSAL INFORMATION

Disposal should be in accordance with Federal, state/provincial and local regulations. Products covered by this MSDS, in their original form, when disposed as waste, are considered non hazardous waste according to Federal RCRA regulations (40 CFR 261).

Alkaline batteries can be safely disposed of with normal household waste. Due to concerns about mercury in the municipal solid waste stream, Duracell has voluntarily eliminated all of the added mercury from its alkaline batteries since 1993. Individual consumers may dispose of spent (used) batteries with household trash. Duracell does not recommend that spent batteries be accumulated and disposed of in large quantities. Do not incinerate except for disposal in a controlled incinerator.

Some communities offer recycling or collection of alkaline batteries – contact your local government for disposal practices in your area.

SECTION 14: TRANSPORT INFORMATION

Products covered by this MSDS, in their original form, are considered “dry cell” batteries and are not regulated for transportation as “DANGEROUS GOODS.” The batteries must be packaged in a manner that prevents the generation of a dangerous quantity of heat and short circuits.

For finished packaged product transported by ground (US DOT): – not regulated
For finished packaged product transported by sea (IMDG) – not regulated
For finished packaged product transported by air (IATA): – not regulated

Special provisions apply and shippers should consult the most current versions of the transportation regulations.

Special Provision A123 in the IATA Dangerous Goods Regulations and ICAO Technical Instructions and Special Provision 130 in 49 CFR 172.102 of the U.S. DOT regulations require alkaline batteries be packed in such a way to prevent short circuits or generating a dangerous quantity of heat. In addition, the IATA Dangerous Goods Regulations and ICAO Technical Instructions require the words "not restricted" and the Special Provision number "A123" be provided on the air waybill, when an air waybill is issued. Special Provision 304 of the IMDG Code (Amdt. 33-06) provides batteries, dry, containing corrosive electrolyte which will not flow out of the battery if the battery case is cracked are not subject to the provisions of this Code provided the batteries are securely packed and protected against short-circuits. Examples of such batteries are alkali-manganese, zinc-carbon, nickel-metal hydride and nickel-cadmium batteries.

SECTION 15: REGULATORY INFORMATION

United States

OSHA Status: While the finished product(s) is considered an article and not covered by the OSHA Hazard Communication Standard, 29 CFR 1910.1200, this MSDS contains valuable information critical to the safe handling and proper use of the product".

EPA TSCA Status: All intentionally-added components of this product are listed on the US TSCA Inventory.

SARA 313/302/304/311/312 chemicals: Manganese compounds 35-40%, Zinc 10-25%

California: This product has been evaluated and does not require warning labeling under California Proposition 65.

State Right-to-Know and CERCLA:
The following ingredients present in the finished product are listed on state right-to-know lists or state worker exposure lists

Ingredient	CAS #	Level	CERCLA RQ	State				
				IL	MA	NJ	PA	RI
Manganese Dioxide	1313-13-9	35-40%	None	Y	Y	N	Y	Y
Zinc	7440-66-6	10-25%	1000 lb	Y	Y	Y	Y	N
Potassium Hydroxide	1310-58-3	5-10%	1000 lb	Y	Y	Y	Y	Y
Graphite	7782-42-5 7440-44-0	1-5%	None	Y	Y	N	Y	Y

Canada All intentionally-added components of this product are listed on the Canadian DSL. This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and this MSDS contains all information required by the Controlled Products Regulations.

SECTION 16: OTHER INFORMATION

P&G Hazard Rating: Health: 0 Fire: 0 Reactivity: 0

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Data supplied is for use only in connection with occupational safety and health.

DISCLAIMER: This MSDS is intended to provide a brief summary of our knowledge and guidance regarding the use of this material. The information contained here has been compiled from sources considered by Procter & Gamble to be dependable and is accurate to the best of the Company's knowledge. It is not meant to be an all-inclusive document on worldwide hazard communication regulations.

This information is offered in good faith. Each user of this material needs to evaluate the conditions of use and design the appropriate protective mechanisms to prevent employee exposures, property damage or release to the environment. Procter & Gamble assumed no responsibility for injury to the recipient or third persons, or for any damage to any property resulting from misuse of the product.

SAFETY DATA SHEET

1. Product and Company Identification

Product Category: Lithium Manganese Dioxide Primary Battery,, Nonrechargeable

Nominal Voltage: 3.6 V

Product Name

Type	Lithium (gr.)
CR123A	**0.49**

Supplier's Name: Tenergy Corporation

Supplier's Address: 436 Kato Terrace, Fremont, CA 94539, United States

Post Code: 94539

Telephone: (510)687-0388

Fax: (510)687-0328

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

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 seal 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 dispose 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.

3. Composition/Information on Ingredient

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	1.0-1.5
1,3-dioxolane(DOL) (CAS Number:646-06-0)	Not established	Not established	10.0-11.0
Propylene Carbonate(PC) (CAS Number:108-32-7)	Not established	Not established	
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 of packing 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 shown 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 Storage

Handing	Do not charge, short-circuit, disassemble, deform, heat above 100℃ or incinerate. Do not pile up or mingle battery 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 protection 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、Prismatic

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

Inhalation, skin contact and eye contact are possible when the battery is opened. Exposure to internal contents, the corrosive fumes will be very irritating to skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibrotic lung injury and membrane irritation.

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 due to short-circuit.

14. Transport Information

During the transportation of a large amount of batteries by ship, trailer or railway, do not expose them to high temperature or high humidity/condensation.

During transporation, do not allow packages to be dropped or damaged.

UN Number: UN3090 (only for Air transport, over 8 cells per package):
Even though these cells are classified as lithium metal batteries (UN3090 or UN3091), they are exempted from being classified as Dangerous Goods because they meet the following requirements:
1. For cells, the lithium content is less than 1g;
2. Each cell is of the type proven to meet the requirements of every test in the UN Manual of Tests and Criteria, Part III, sub-section 38.3;
3. Each cell is manufactured at a ISO9001 certified factory.

Proper shipping name: Lithium metal batteries

UN Class : Class 9 (Only for Air transport, over 8 cells per package)
: Not Applicable (for Air transport by Section II and the Marine transport)

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.

Passenger Aircraft Ban (for batteries only)

Effective December 29, 2004,all primary lithium batteries are banned as on passenger aircraft. In addition to rule requires that the outside of each package that contains primary lithium batteries, regardless of size or number of batteries, be labeled with the following statement: **"PRIMARY LITHIUM BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT".**

Information of reference

Method of Transportation	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, Cargo Aircraft only, no more than one package in any single consignment. Max 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 58th Edition (IATA DGR)
- IMO International Maritime Dangerous Goods Code 2014 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 Regulation, Evaluation, Authorization and Restriction of Chemicals (REACH)
- State of California Regulations – Best management practices of Perchlorate Materials.

16. Other information

Revision Information:
Date of this revision: 2017.3.03
Training advice:
Provide adequate information, instruction and training for operators.
Abbreviations and acronyms:

GHS:	Globally Harmonized System of Classification Labeling of Chemicals.
CAS:	Chemical Abstracts Service registration number.
NIOSH:	US National Institute for Occupational Safety and Health
OSHA:	US Occupational Safety and Health
LD50:	Lethal Dose, 50 percent kill
ITAT	International Air Transport Association
IMDG:	International Maritime Dangerous Goods
TSCA:	Toxic Substances Control Act,
IECSC:	Inventory of existing chemical substances in China

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SAFETY DATA SHEETS
Based on 1910.1200 App D

The batteries are articles and are not subject to the OSHA Hazard Communication Standard Requirement as shown in paragraph (b)(6)(v) of §1910.1200. This sheet is provided as technical information only. The information and recommendations set forth are made in good faith and are believed to be accurate as of the date of preparation. However, **Maxell makes no warranty expressed or implied.**

1. Identification

(a) Product identifier used on the label:

CR/maxell/3V/+

(b) Other means of identification:

Lithium manganese dioxide battery

(c) Recommended use of the chemical and restrictions on use:

See **7.Handling and storage**

(d) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party:

Manufacturer: Hitachi Maxell, Ltd.
Address: 5, Takumidai, Ono-shi, Hyogo 675-1322, Japan
Tel: +81-(0)794-63-8054
Fax: +81-(0)794-63-8058

(e) Emergency phone number.

Tel: +81-(0)794-63-8054

2. Hazard(s) identification

(a) Classification of the chemical in accordance with paragraph (d) of §1910.1200

Chemical battery (Primary)

(b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200. (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones)

N/A

(c) Describe any hazards not otherwise classified that have been identified during the classification process

This contains lithium, organic solvent, and other combustible materials. For this reason, improper handling of the battery could lead to distortion, leakage*, overheating, explosion, or fire and cause human injury or equipment trouble. Please strictly observe safety instructions.

(* Leakage is defined as an unintended escape of liquid from a battery.)

(d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration ≥1% and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required

No such an ingredient is contained in the product.

3. Composition/information on ingredients

Except as provided for in paragraph (i) of §1910.1200 on trade secrets:

For Substances:

(a) Chemical name

(b) Common name and synonyms

(c) CAS number and other unique identifiers

(d) Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance

Chemical Name	Common Name and Synonyms	CAS #	Content (Wt %)
Manganese Dioxide	MnO_2	1313-13-9	15 to 40
Propylene Carbonate	$C_4H_6O_3$	108-32-7	2 to 6
1,2-Dimethoxyethane	$C_4H_{10}O2$	110-71-4	1 to 5
Lithium Perchlorate	$LiClO_4$	7791-03-9	0.1 to 1.5
Lithium or Lithium Alloy	Li	7439-93-2	1 to 5
Graphite	C	7782-42-5	1 to 4

Lithium content for each cell

Model	Li content (g)	Model	Li content (g)
CR1216	0.008	CR2016	0.03
CR1220	0.011	CR2025	0.05
CR1616	0.02	CR2032	0.07
CR1620	0.025	CR2032H	0.07
CR1632	0.04	CR2430	0.09
		CR2450	0.18

For Mixtures

In addition to the information required for substances:

(a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1910.1200 and

(1) Are present above their cut-off/concentration limits; or

(2) Present a health risk below the cut-off/concentration limits.

No such an ingredient is contained in the product.

(b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with paragraph (i) of §1910.1200, when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (See A.0.5.1.2) with similar chemical composition. In these cases, concentration ranges may be used.

No such a situation would happen during the production from batch to batch.

For All Chemicals Where a Trade Secret is claimed

Where a trade secret is claimed in accordance with paragraph (i) of §1910.1200, a statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

4. First-aid measures

(a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion

Inhalation	Fumes can cause respiratory irritation. Remove to fresh air and consult a physician.
Skin Contact	Immediately flush skin with plenty of water. If itch or irritation by chemical burn persists, consult a physician.
Eye Contact	Immediately flush eye with plenty of water for at least 15 minutes. Consult a physician immediately
Ingestion	If swallowing a battery, consult a physician immediately. If contents come into mouth, immediately rinse by plenty of water and consult a physician.

(b) Most important symptoms/ effects, acute and delayed

NA.

(c) Indication of immediate medical attention and special treatment needed, if necessary

Wash with clean water immediately.

5. Fire-fighting measures

(a) Suitable (and unsuitable) extinguishing media.

Extinguisher of alkaline metal fire is effective. Plenty of cold water is also effective to cool the surrounding area and control the spread fire.

(b) Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products).

Hydrogen gas may be evolved by the reaction of water and lithium and it can form an explosive mixture. Therefore when lots of lithium batteries are burning in a confined space, use a smothering agent (ex. Carbon dioxide or dry sand).

(c) Special protective equipment and precautions for fire-fighters.

Use self-contained breathing apparatus and full protective gear not to inhale harmful gas.

6. Accidental release measures

(a) Personal precautions, protective equipment, and emergency procedures.

Wear protective clothing. Keep unprotected persons away.

(b) Methods and materials for containment and cleaning up.

When the liquid leaks out of the battery, absorb and wipe it with dry cloth.

Keep the battery away from fire or heat.

7. Handling and storage

(a) Precautions for safe handling.

● Never swallow.

If swallowed, see Section 4 - First Aid Measures.

● Never charge.

The battery is not designed to be charged by any other electrical source. Charging could generate gas and internal short-circuiting, leading to distortion, leakage, overheating, explosion, or fire.

● Never heat.

Heating the battery to more than 100 degree centigrade could increase the internal pressure, causing distortion, leakage, overheating, explosion, or fire.

● Never expose to open flames.

Exposing to flames could cause the lithium metal to melt, causing the battery to catch on

fire and explosion.

● Never disassemble the battery.

Do not disassemble the battery, because the separator or gasket could be damaged, leading to distortion, leakage, overheating, explosion or fire.

● Never reverse the positive and negative terminals when mounting.

Improper mounting of the battery could lead to short-circuiting, charging or forced-discharging. This could cause distortion, leakage, overheating, explosion, or fire.

● Never short-circuit the battery.

Do not allow the positive and negative terminals to short-circuit. Never carry or store the battery with metal objects such as a necklace or a hairpin. Do not take multiple batteries out of the package and pile or mix them when storing. Otherwise, this could lead to distortion, leakage, overheating, explosion, or fire.

● Never weld the terminals or weld a wire to the body of the battery directly.

The heat of welding or soldering could cause the lithium to melt, or cause damage to the insulating material in the battery. This could cause distortion, leakage, overheating, explosion, or fire.

● Never use different batteries together.

Using different batteries together, i.e. different type or used and new or different manufacturer could cause distortion, leakage, overheating, explosion, or fire because of the differences in battery property.

● Never allow liquid leaking from the battery to get in your eyes or mouth.

If the liquid comes into eyes, or mouth, see Section 4 - First Aid Measures.

●Keep leaking batteries away from fire.

If leakage is suspected or you detect a strong odor, keep the battery away from fire, because the leaked liquid could catch on fire.

● Never touch the battery electrodes.

Do not allow the battery electrodes to come in contact with your skin or fingers. Otherwise, the moisture from your skin could cause a discharge of the battery, which could produce certain chemical substances causing you to receive a chemical burns.

(b) Conditions for safe storage, including any incompatibilities.

Never let the battery contact with water. Never store the battery in hot and high humid place.

.

8. Exposure controls/personal protection

(a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit

used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.

N/A

(b) Appropriate engineering controls.

Do not disassemble the product without professional basis.

(c) Individual protection measures, such as personal protective equipment.

No special equipment is required for handling, carrying or using the product.
The chemical materials concluded in the Product is sealed up, thus being stable, safe and eco-friendly under common conditions.

9. Physical and chemical properties

(a) Appearance (physical state, color, etc.)	:	The appearance is a coin shape and it is a primary cell with 3V nominal voltage.
(b) Odor	:	not applicable
(c) Odor threshold	:	not applicable
(d) pH	:	not applicable
(e) Melting point/ freezing point	:	not applicable
(f) Initial boiling point and boiling range	:	not applicable
(g) Flash point	:	not applicable
(h) Evaporation rate	:	not applicable
(i) Flammability (solid, gas)	:	not applicable
(j) Upper/lower flammability or explosive limits	:	not applicable
(k) Vapor pressure	:	not applicable
(l) Vapor density	:	not applicable
(m) Relative density	:	not applicable
(n) Solubility(ies)	:	not applicable
(o) Partition coefficient: n-octanol/ water	:	not applicable
(p) Auto-ignition temperature	:	not applicable

(q) Decomposition temperature : not applicable

(r) Viscosity : not applicable

10. Stability and reactivity

(a) Reactivity

N/A

(b) Chemical stability

Stable (performance deterioration depends on circumstance.)

(c) Possibility of hazardous reactions

No.

(d) Conditions to avoid (e.g., static discharge, shock, or vibration)

See **7.Handling and storage**

(e) Incompatible materials

Water

(f) Hazardous decomposition products

Hydrogen (By moisture).

11. Toxicological information

Description of the various toxicological (health) effects and the available data used to identify those effects, including

(a) Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact)

As the contents are sealed in the battery case, there is no toxicity.

(b) Symptoms related to the physical, chemical and toxicological characteristics

People might feel itching, if the inner liquid splashes onto skin.

(c) Delayed and immediate effects and also chronic effects from short- and long-term exposure

N/A

(d) Numerical measures of toxicity (such as acute toxicity estimates)

N/A

(e) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition), or by OSHA

No.

12. Ecological information (Non-mandatory)

(a) Ecotoxicity (aquatic and terrestrial, where available): N/A

(b) Persistence and degradability: N/A

(c) Bio-accumulative potential: N/A

(d) Mobility in soil: N/A

(e) Other adverse effects (such as hazardous to the ozone layer) : If the battery is disposed in land or water, battery case may be corroded and the liquid may leak out of the battery. Information regarding ecological concerns has not been reported.

13. Disposal considerations (Non-mandatory)

Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

The battery may be regulated by national or local regulation. Please follow the instructions of proper regulation. As electric capacity is left in a discarded battery and it comes into contact with other metals, it could lead to distortion, leakage, overheating, or explosion, so make sure to cover the (+) and (-) terminals with friction tape or some other insulator before disposal.

14. Transport information (Non-mandatory)

1) Shipping Name (UN Number): Lithium metal batteries (UN3090)
Lithium metal batteries packed with equipment (UN3091)
Lithium metal batteries contained in equipment (UN3091)

2) Hazard Classification: Class 9 (Miscellaneous)

3) Method of transportation: As the cells are manufactured under a quality management programme in the ISO9001 certified factory and the cells meet all the requirements in UN manual of tests and criteria, Part III, sub-section 38.3, the applicable packing instructions (PI) or special provisions (SP) are as per the following table.

The cells or batteries classified in Section II of any Packing Instruction or SP188 may be exempted from Class 9 Dangerous Goods if complying with all requirements of applicable Section II or SP188. But Lithium metal cells and batteries transported as cargo are

restricted to Cargo Aircraft Only since January 1st 2015.

Note. The prohibition does not apply to lithium metal batteries packed with equipment (PI 969) or contained in equipment (PI 970).

Li content per cell	Product name	Air *See Section 15 4)			Sea *See Section 15 5)
		Cell only	Cell packed with equipment	Cell contained in equipment	
not more than 0.3 g	CR1216, CR1220, CR1616, CR1620, CR1632, CR2016, CR2025, CR2032, CR2032H, CR2430, CR2450	PI968 Section II	PI969 Section II	PI970 Section II	SP188
more than 0.3 g but not more than 1 g	(No)	PI968 Section IB (8 or less cells: Section II)	PI969 Section II	PI970 Section II	SP188
more than 1 g	(No)	PI968 Section IA	PI969 Section I	PI970 Section I	SP230

As the related district, country or airline may establish their special requirements, the shipper shall confirm them with the forwarder in advance.

Please confirm the aggregate lithium content when transport the battery.

(a) UN proper shipping name: Lithium metal batteries

(b) Packing group, if applicable: as table mentioned above

(c) Environmental hazards (e.g., Marine pollutant (Yes/No)) No.

(d) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)

N/A for Annex II of MARPOL 73/78 and the IBC Code.
The products can be transported if complying with ICAO Technical Instructions or IMDG-Code.

(e) Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises

Avoid high-temperature, high-humidity condition.

15. Regulatory information

Major applicable regulations for the transportation of lithium metal cells and batteries are as follows:

1) UN(United Nations) Recommendations on the Transport of Dangerous Goods: Model Regulations 18th revised edition

2) UN(United Nations) Recommendations on the Transport of Dangerous Goods: Manual of Test and Criteria 5th revised edition, Amendment 2

3) International Civil Aviation Organization (ICAO): Technical Instructions for Safety Transport of Dangerous Goods by Air, 2015-2016 Edition

4) International Air Transport Association (IATA): Dangerous Goods Regulations, 56th Edition

5) International Maritime Organization (IMO): International Maritime Dangerous Goods (IMDG) Code, 2014 Edition

Major environmental regulations are as follows:

1) EU BATTERY DIRECTIVE (2006/66/EC)

2) California Code of regulations, Title 22, Division 4.5, Chapter 33: Best Management Practices for Perchlorate Materials

16. Other information, including date of preparation or last revision

The date of preparation of the SDS or the last change to it

If you want further information, please contact Maxell sales representative.

Product Information Sheet

Panasonic Batteries
Panasonic Industrial Company
A Division Panasonic Corporation of North America
5201 Tollview Drive, 1F-3
Rolling Meadows, IL 60008
Toll Free: 877-726-2228
Fax: 847-637-4660
Internet: www.panasonic.com/industrial/batteries-oem
e-mail: oembatteries@panasonic.com

Product: Manganese Dioxide (CR Type) Lithium Batteries
Applicable models/sizes: All CR type cylindrical and coin batteries

Revision: January 1, 2018

The batteries referenced herein are exempt articles and are not subject to the OSHA Hazard Communication Standard requirement. This sheet is provided as a service to our customers.

SDS

Safety Data Sheets (SDS) are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article". OSHA has defined "article" as a manufactured item other than a fluid or particle; (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g. minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

Because all of our batteries are defined as "articles", they are exempt from the requirements of the Hazard Communication Standard; hence a SDS is not required.

The following components are found in a Panasonic Manganese Dioxide (CR) Lithium battery:

Cylindrical Cell Components	Material	Formula	CAS #
Positive Electrode	Manganese Dioxide	MnO_2	1313-13-9
Negative Electrode	Lithium	Li	7439-93-2
Electrolyte	Propylene Carbonate-Solvent	$C_4H_6O_3$	108-32-7
	1,2 Dimethoxyethane-Solvent	$C_4H_{10}O_2$	110-71-4
	Lithium Triflate-Salt	CF_3SO_3Li	33454-82-9
Coin Cell Components	**Material**	**Formula**	
Positive Electrode	Manganese Dioxide	MnO_2	1313-13-9
Negative Electrode	Lithium	Li	7439-93-2
Electrolyte	Propylene Carbonate-Solvent	$C_4H_6O_3$	108-32-7
	1,2 Dimethoxyethane-Solvent	$C_4H_{10}O_2$	110-71-4
	Lithium Perchlorate-Salt	$LiClO_4$	7791-03-9

Lithium Triflate is Lithium Trifluoromethanesulfonate.

DISPOSAL

Lithium batteries are neither specifically listed nor exempted from the Federal Environmental Protection Agency (EPA) hazardous waste regulations as promulgated by the Resource Conservation and Recovery Act (RCRA). The only metal of possible concern in a lithium battery is lithium that is not a listed or characteristic toxic hazardous waste. Waste lithium batteries can be considered a reactive hazardous waste if there is a significant amount of unreacted, or unconsumed lithium remaining in the spent battery. The key to disposing of a lithium battery as a non-hazardous waste is to guarantee that it is fully or mostly discharged. Once it is discharged it can be disposed of as non-hazardous waste. You can dispose of a fully charged or partially discharged lithium battery as a hazardous waste after they are first neutralized through an approved secondary treatment. The need for a secondary treatment prior to disposal is a requirement of the U.S. Land Ban Restrictions of the Hazardous and Solid Waste Amendments of 1984. A secondary treatment center can only receive these batteries as manifested hazardous waste. The waste code for charged lithium

batteries is D003, reactive. **In either case, button cell batteries contain so little lithium that they never qualify as a reactive hazardous waste. These batteries are safe for disposal in the normal municipal waste stream.** Disposal of large quantities of undischarged lithium batteries should be performed by permitted, professional disposal firms knowledgeable in Federal, State and local hazardous materials and hazardous waste transportation and disposal requirements. As always, households are exempt from the RCRA hazardous waste guidelines.

In California, packages that contain CR lithium coin cells and the Owners/Operating Instructions of products that contain CR lithium coin cells must include the following statement: "Perchlorate Material – special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchorate".

TRANSPORTATION

All Panasonic lithium batteries are not subject to the requirements of the Department of Transportation (DOT) Subchapter C, Hazardous Materials Regulations if shipped in compliance with 49 CFR 173.185.

Effective January 1, 2018 all Panasonic lithium batteries can be shipped by air in accordance with International Civil Aviation Organization (ICAO), 2017-2018 edition, Section II or Section 1B or International Air Transport Association (IATA) 59th edition, Section II or Section 1B Packing Instructions (PI) 968 (Batteries), PI 969 (Batteries, packed with equipment) and PI 970 (Batteries, contained in equipment) as appropriate

All Panasonic lithium batteries are regulated by the International Maritime Organization (IMO), 2016, 38th amendment, under Special Provisions 188 and 230.

All Panasonic lithium cells are tested and comply with the UN Model Regulations, Manual of Test and Criteria, Part III, subsection 38.3.

If you build any of our lithium cells into a battery pack, you must also assure that they are tested in accordance with the UN Model Regulations, Manual of Test and Criteria. Part III, subsection 38.3, 6th revised edition.

If you plan on transporting any untested prototype battery packs contact your Panasonic Sales Representative for regulatory information. Check with your air carrier before shipping. Many air carriers have additional requirements.

First Aid

If you get electrolyte in your eyes, flush with water for 15 minutes without rubbing and immediately contact a physician. If you get electrolyte on your skin wash the area immediately with soap and water. If irritation continues, contact a physician. If a battery is ingested, call the National Capital Poison Center (NCPC) at 202-625-3333 (Collect) or your local poison center immediately. Lithium coin batteries lodged in the esophagus should be removed immediately. Leakage, chemical burns and perforation can occur within hours of ingestion.

General Recommendations

CAUTION: Risk of fire, explosion and burns. Do not recharge, crush, heat above 212^{O}F (100^{O}C) or incinerate.

Fire Safety

In case of fire, you can use a Class "D" fire extinguisher or other smothering agent such as Lith-X, copper powder or dry sand. If you use water, use enough to smother the fire. Cooling the exterior of the batteries will help prevent rupturing. Fire fighters should use self-contained breathing apparatus. Detailed information on fighting a lithium metal battery fire can be found in Guide 138 (Substances – Water – Reactive) of the US DOT Emergency Response Guide.

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Rolling Meadows, IL 60008
Toll Free: 877-726-2228
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MATERIAL SAFETY DATA SHEET

Issued/Revised date :December, 12 2013
Document No. : AS1312120134

1. Product and Company Identification

Product Identification :
Lithium-Ion Rechargeable Single pack battery /1S1P

Model name	SMP P/N	Asus P/N	Description
C11P1326	G06TA076H G06QA076H	0B200-00920100	1S1P, Sanyo 359191

Made in China

Manufacturer :
Simplo Technology Co., Ltd.
No.471, Sec.2, Pa Teh Rd,. Hu Kou 303, Hsin Chu Hsien, Taiwan
Tel : +886-3-5695920 Fax : +886-3-5695931
Simplo Technology (CHANGSHU) INC.
No.2 DongNan Avenue,ChangShu,JiangSu Province , China
Tel :+86-0512-52302255 Fax :+86- 0512-52302277
Simplo Technology (CHONGQING) INC
NO.2 Zongbao Avenue, Shapingba District,Chongqing,China
Tel :023-61718899 Fax : 023-61710488

2. Hazards Identification

Primary routes of entry : Skin contact, Skin absorption; Eye contact, Inhalation and ingestion: No
Symptoms of exposure : Skin contact, No effect under routine handling and use.
Skin absorption : No effect under routine handling and use.
Eye contact : No effect under routine handling and use.
Inhalation : No effect under routine handling and use.
Reported as carcinogen : Not applicable

3. Composition / Identification on Ingredients

Substance : Lithium Ion Battery
CAS number : Reference 3-3
UN Class : Even classified as lithium batteries, they are exempted from dangerous goods.
UN-Recommendations on the Transport of Dangerous Goods Model Regulations.

* Lithium ion cells and batteries may be offered for transport if they meet the following :
* For cells, the Watt-hour rating should not be more than 20 Wh;
* For batteries, the Watt-hour rating should not be more than 100 Wh. The Watt-hour rating must be marked on the outside of the battery case .
* Each cell or battery of the type proved to meet the requirements of each test in the UN manual of tests and criteria, Part III, subsection 38.3.
* General requirements and additional requirements, Please see Section II or IB of Packing Instruction 965, 966, 967 accordingly or UN 3480 , UN3481.

Composition :

3-1. Cases: Plastic — Not dangerous
3-2. Printed Circuit Board Assembly — Not dangerous
3-3. Lithium Ion Cell :

Hazardous Ingredients	%	CAS Number
Graphite	7-25 %	7782-42-5
Lithium Cobalt Oxide	15-40 %	12190-79-3
Hexafluoropropylene-vinylidene fluoride Copolymer	3 -15%	9011-17-0
Lithium Hexafluorophosphate	0 - 5%	21324-40-3
Acetylene Black	0 - 2 %	1333-86-4
Diethyl Carbonate	0 -15%	105-58-8
Dimethyl Carbonate	0 -15%	616-38-6
Ethyl Methyl Carbonate	0 -15%	623-53-0
Propylene Carbonate	0 -15%	108-32-7
Ethylene Carbonate	0 -15%	96-49-1

4. First Aid Measures

Inhalation : Make the victim blow his/her nose, gargle. Seek medical attention if necessary.
Skin contact : Remove contaminated clothes and shoes immediately. Wash extraneous matter or contact region with soap and plenty of water immediately.
Eye contact : Do not rub one's eyes. Immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention immediately.
Ingestion : Make the victim vomit. When it is impossible or the feeling is not well after vomiting, seek medical attention.

5. Fire Fighting Measures

Extinguishing Media : Use suitable extinguishing media.
Firefighting Equipment : Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

6. Accidental Release Measures

On Land : Place material into suitable containers and call local fire/police department.
In Water : If possible, Remove from water and call local fire/police department.

7. Handling and Storage

Handling :
Do not expose the battery to excessive physical shock or vibration. Short-circuiting should be avoided. However, accidental short-circuiting for a few seconds will not seriously affect the battery. Prolonged short circuits will cause the battery to rapidly lose energy, could generate enough heat to burn skin. Sources of short circuits include jumbled batteries in bulk containers, coins, metal jewelry, metal covered tables, or metal belts used for assembly of batteries in devices. To minimize risk of

short-circuiting, the protective case supplied with the battery should be used to cover the terminals when transporting or storing the battery. Do not disassemble or deform the battery. Should an individual cell within a battery become ruptured, do not allow contact with water.
Storage :
The lithium ion battery should be between 25% and 75% of full charge when stored for a long period of time. Store in a cool, dry, well ventilated area. And temperature above 100 Celsius degree can result in loss of battery performance, leakage, or rust. Do not expose the battery to open flames..

8. Exposure Controls / Personal Protection

Engineering Controls : Keep away from heat and open flame. Store in a cool dry place
Personal Protection :
Respirator : Not required during normal operations. SCBA required in the event of a fire.
Eye/Face Protection : Not required beyond safety practices of employer.
Gloves : Not required for handling of battery.
Foot Protection : Steel toed shoes recommended for large container handling.

9. Physical and Chemical Properties

State	Solid
Odor	N/A
PH	N/A
Vapor pressure	N/A
Vapor density	N/A
Boiling point	N/A
Solubility in water	Insoluble
Specific gravity	N/A
Density	N/A

10. Stability and Reactivity

Reactivity : None
Incompatibilities : None during normal operation. Avoid exposure to heat, open flame, and corrosives.
Conditions to Avoid : Avoid exposure to heat and open flame. Do not puncture, crush or incinerate.

11. Toxicological Information

This product does not elicit toxicological properties during routine handling and use.

12. Ecological Information

Lithium ion battery pack can be disposable in accordance with appropriate federal, state and local regulations.

13. Disposal Consideration

Recommended methods for safe and environmentally preferred disposal:
Product(waste from residues)

Do not throw out a used battery cell. Recycle it through the recycling company.
Contaminated packaging
Neither a container nor packing is contaminated during normal use. When internal materials leaked from a battery cell contaminates, dispose as industrial wastes subject to special control.

14. Transport Information

Regulations specifically applicable to the product: International Air Transport Association (IATA) Dangerous Goods Regulations (55th Edition,2014).
Section IB or Section II of Packing Instruction 965 for Lithium Ion battery
Special Provisions A51, A88, A99, A154 , A164 and A183
Section II of Packing Instruction 966 for Lithium Ion battery packed with equipment
Special Provisions A88, A99, A154 , A164 , A181 and A185
Section II of Packing Instruction 967 for Lithium Ion battery contained in equipment
Special Provisions A48, A99, A154 ,A164 , A181 and A185,
UN 3480 (Lithium ion batteries) and UN3481 (Lithium ion batteries contained in equipment or Lithium ion batteries packed with equipment)
US Department of Transportation (DOT) 49 code of Federal Regulations [USA]
International Civil Aviation Organization (ICAO) Technical Instructions (2013-2014 Edition)
Transport Regulations for Sea Transport IMDG Code (2012 Edition) Class 9 exemptions

Our products are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to all the applicable international and national governmental regulations, not limited to the above mentioned. We further certify that the enclosed products have been tested and fulfilled the requirements and conditions in accordance with UN Recommendations (T1 – T8) on the Transport of Dangerous Goods Model Regulations and the Manual of Testes and Criteria that can be treated as "Non-Dangerous Goods".

Test results of the UN Recommendation on the Transport of Dangerous Goods

No	Item	Result	Remark
1	Altitude simulation	PASS	
2	Thermal test	PASS	
3	Vibration	PASS	
4	Shock	PASS	
5	External short circuit	PASS	
6	Crush	PASS	
7	Overcharge	PASS	
8	Force discharge	N/A	For cell only

15. Regulatory Information

Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.4)
OSHA Hazard communication standard (29 CFR 1910.1200)

_____ Hazardous V Non-hazardous

16. Other Information

The information contained in this Safety data sheet is based on the present state of knowledge and current legislation.
This safety data sheet provides guidance on health, safety and environmental aspects of the product and should not be construed as any guarantee of technical performance or suitability for particular applications.
Chemical substances information: Japan Advanced Information center of Safety and Health
International Chemical Safety Cards (ICSCs):
International Occupational Safety and Health Information Centre (CIS)
1999 TLVs and BEIs: American Conference of Governmental Industrial Hygienists (ACGIH)
Wastes Disposal and Public Cleaning Law [Japan]
Law for Promotion of Effective Utilization of resources [Japan]

SAFETY DATA SHEET

Product Name: Lithium-ion
Rechargeable Battery

436 Kato Terrace, Fremont, CA 94539 U.S.A.
Tel: 510.687.0388 Fax: 510.687.0328
www.Tenergy.com

Tenergy Corporation
436 Kato Terrace
Fremont, CA 94539
Tel: 510.687.0388 Fax: 510.687.0328
www.Tenergy.com email: sales@tenergy.com

Lithium-ion Battery

Section 1 – Chemical Product and Company Identification

Chemical product identification

Product Name:	Lithium-ion Battery
Product Code:	None
Restrictions on use:	N/A

Company identification

Company:	Tenergy Corporation
Address:	436 Kato Terrace, Fremont, CA, United State
Post code:	94539
E-mail:	sales@Tenergy.com
Telephone :	510-687-0388
Fax:	510-687-0328

Section 2 – Hazards Identification

Emergency overview: Not considered dangerous as manufactured. If battery is damaged, exposure to product components may cause eye, skin, and respiratory tract irritation. Combustion products from a fire involving batteries may be harmful.
Classification according to GHS: Not a dangerous substance according to GHS.

Potential Health Effects

Eyes and skin:	None anticipated under normal product use and handling conditions. If battery is damaged, exposure may cause severe irritation or burns.
Injection:	Not considered a likely route of exposure under normal product use and handling conditions. Ingestion of material from a damaged battery may cause serious burns to mouth, esophagus, and gastrointestinal tract.
Inhalation:	None anticipated under normal product use and handling conditions. If battery is damaged, exposure to vapors or mist may cause respiratory irritation.

HMIS Ratings:

Health:	0
Fire:	0
HMIS Reactivity:	0

Hazard Scale: 0=minimal 1=slight 2=moderate 3=serious 4=severe *=chronic hazard

Emergency overview: In case of accident or if you feel unwell, seek medical advice immediately. See Section 4 for more information.

Tenergy Corporation
436 Kato Terrace
Fremont, CA 94539
Tel: 510.687.0388 Fax: 510.687.0328
www.Tenergy.com email: sales@tenergy.com

Section 3 – Composition, Information on Ingredients

Chemical characterization: Mixture
Emergency overview: N/A

Chemicals	Composition (% by weight)	CAS NUMBER
Lithium Metal Oxide (Co, Mn, Ni)	37%	12190-79-3
Graphite powder	23%	7782-42-5
Polypropylene	4%	9003-07-0
Electrolyte	13%	21324-40-3
Polyethylene	0.8%	9002-88-4
Copper	7%	7440-50-8
Aluminium	8%	7429-90-5
Polyvinylidene fluoride	0.9%	24937-79-9
Silicon	1.4%	7440-21-3
EpoxyResin	1.6%	38891-59-7
PVC	0.4%	9002-86-2
Nickel	2.5%	7440-02-0
Gold	0.3%	7440-57-5
Tin	0.1%	7440-31-5

Section 4 – First Aid Measures

First Aid: Eyes

Flush eyes with lukewarm water for at least 30 minutes while holding the eyelids open. Seek immediate medical care.

First Aid: Skin

Remove contaminated clothing, shoes and leather goods. Flush with water for at least 30 minutes. Seek medical attention if symptoms persist.

First Aid: Ingestion

Never give anything by mouth if victim is unconscious. Rinse mouth thoroughly water. Do not induce vomiting. Seek immediate medical attention.

First Aid: Inhalation

Remove person to fresh air away from source of contamination.

Section 5 – Fire Fighting Measures

General Fire Hazards

See section 9 for flammability properties. Battery cells may rupture when exposed to excessive heat.

Hazardous Combustion Products

May release toxic fumes if burned or exposed to fire

Suitable extinguishing agent:

Use extinguishing agent suitable for local conditions and the surrounding environment. Such as dry powder, CO_2. For damaged or ruptured cells, use Class D extinguisher or other appropriate agent. Class C fire extinguishers should be used to extinguish electrical fires. Do not use water to extinguish electrical or ruptured cell related fires.

Specific Hazards arising from the chemical:

Special hazards arising from the substance or mixture.

Battery may burst and release hazardous decomposition products when exposed to a fire situation. When damaged or abused(e.g. mechanical damage or electrical overcharging); may burn rapidly with flare-burning effect; may ignite other batteries in clothes proximity.

Fire-fighting measures and protection for fire-fighters:

Protective equipment: wear self-contained respirator. Wear fully protective impervious suit.

Section 6 – Accidental Release Measures

Containment Procedures:

Stop the flow of material, if this is without risk

Clean-up Procedures:

Absorb spill with inert material. Shovel material into appropriate container for disposal. Clean spill area with detergent and water; collect wash water for proper disposal.

Evacuation Procedures

Isolate area. Keep unnecessary personnel away.

Special Procedures

Avoid skin contact with the spilled material.

Emergency procedures:

Remove ignition sources, evacuate area. Sweep up using a method that does not generate dust. Collect as much of the spilled material as possible, placed the spilled material into a suitable disposal container. Keep spilled material out of sewers, ditches and bodies of water.

Environmental precautions:

Do not allow material to be released to the environment without proper governmental permits.

Methods and materials for containment and cleaning up:

All waste must refer to the United Nations, the national and local regulations for disposal.

See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

Section 7 – Handling and Storage

Handling Procedures

Avoid damaging or rupturing battery.

Storage Procedures

Store in a dry location at room temperature. Avoid extreme heat or fire. Keep out of reach of children.

Section 8 – Exposure Controls, Personal Protection

A: Component Exposure Limits

ACGIH, OSHA, and NIOSH have not developed exposure limits for any of this product's components.

Engineering Controls
Not necessary under normal product use conditions.
PERSONAL PROTECTIVE EQUIPMENT
Personal Protective Equipment: **Eyes/Face**
Not necessary under normal product use conditions. Wear safety glasses if handling a damaged battery.
Personal Protective Equipment: Skin
Not necessary under normal product use conditions. Wear neoprene or natural rubber gloves when handling a damaged battery.
Personal Protective Equipment: Respiratory
Not necessary under normal product use conditions.
Personal Protective Equipment: General
Eyewash fountains and emergency showers are required.

Section 9 – Physical and Chemical Properties

Information on basic physical and chemical properties
General information

Appearance: Various shaped battery	Specific Gravity: NA
Odor: None	Evaporation Rate: NA
Physical State: Solid	VOC: NA
pH: NA	Octanol/H2O Coeff.: NA
Vapor Pressure: NA	Flash Point: NA
Vapor Density: NA	Flash Point Method: NA
Boiling Point: NA	Upper Flammability Limit (UFL): NA
Melting Point: NA	Lower Flammability Limit (LFL): NA
Solubility (H2O): Insoluble	Burning Rate: NA
Auto Ignition: NA	

Section 10 – Stability and Reactivity

Chemical Stability: This is a stable material.
Chemical Stability: Conditions to Avoid
Avoid exposure to elevated temperatures and fire.
Incompatibility
Not Available.
Hazardous Decomposition
May release toxic fumes if burned or exposed to fire.
Possibility of Hazardous Reactions
Not Available.

Section 11 – Toxicological Information

Organic Electrolyte
・Acute toxicity: LD50, oral - Rat 2,000mg/kg or more

・Irritating nature: Irritative to skin and eye

Section 12 – Ecological Information

Persistence/degradability:
Since a battery cell and the internal materials remain in the environment, do not bury or throw out into the environment.

Section 13 – Disposal Considerations

Recommended methods for safe and environmentally preferred disposal:
Product (waste from residues)
Specified collection or disposal of lithium ion battery is required by the law like as "battery control law" in several nations. Collection or recycle of the battery is mainly imposed on battery's manufacturer or importer in the nations recycle is required.
Contaminated packaging
Neither a container nor packing is contaminated during normal use. When internal materials leaked from a battery cell contaminates, dispose as industrial wastes subject to special control.

Section 14 – Transport Information

According to PACKING INSTRUCTION 967 (UN3481) / 965 (UN3480) of IATA DGR 59th Edition for transportation, the special provision 188 of IMDG (including Amendment 35-10), these batteries should be securely packed and protected against short-circuits. Examine whether the package of the containers are integrate and tighten closed before transport. Take in a cargo of them without falling, dropping, and breakage. Prevent collapse of cargo piles. Don't put the goods together with oxidizer and chief food chemicals. The transport vehicle and ship must be cleaned and sterilized otherwise it is not allowed to assemble articles. During transport, the vehicle should prevent exposure, rain and high temperature. For stopovers, the vehicle should be away from fire and heat sources. When transported by sea, the assemble place should keep away from bedroom and kitchen, and isolated from the engine room, power and fire source. Under the condition of Road Transportation, the driver should drive in accordance with regulated route, don't stop over in the residential area and congested area. Forbid to use wooden, cement for bulk transport.

(a) UN Number	3480 & 3481
(b) UN Proper Shipping Name	LITHIUM ION BATTERIES (including lithium ion Cylindrical batteries) or LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion Cylindrical batteries)
(c) Transport hazard class(es)	9
(d) Packing group (if applicable)	II
(e) Marine pollutant (Yes/No)	None
(f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)	No information available
(g) Special precautions	No information available

(h) Organizations governing the transport of lithium batteries

Area	Method	Organization	Special Provision
U.S.A	Air, Rail, Road, Marine	DOT	49 CFR Section 173.185

Section 15 – Regulatory Information

Safety, health and environmental regulations specific for the product in question:

CAS No.	USA TSCA	EU EINECS	Japan ENCS	Korea ECL	China IECSC	Canada DSL
7782-42-5	Listed	Listed	Not listed	Listed	Listed	Listed
21324-40-3	Not listed	Listed	Listed	Listed	Listed	Not listed
9002-88-4	Listed	Listed	Listed	Listed	Listed	Listed
7440-50-8	Not listed	Listed	Listed	Listed	Listed	Not listed
7440-02-0	Not listed	Listed	Listed	Listed	Listed	Not listed
24937-79-9	Listed	Not listed	Listed	Listed	Listed	Listed
9003-07-0	Listed	Listed	Listed	Listed	Listed	Listed
7429-90-5	Listed	Listed	Listed	Listed	Listed	Listed
7440-21-3	Listed	Listed	Listed	Listed	Listed	Not listed
38891-59-7	Not listed	Not listed	Listed	Listed	Not listed	Not listed
9002-86-2	Listed	Not listed	Listed	Listed	Listed	Not listed
7440-57-5	Listed	Listed	Listed	Listed	Listed	Not listed
7440-31-5	Listed	Not listed	Listed	Listed	Listed	Not listed

Section 16 – Additional Information

Revision Information:
Date of this revision: 01/16/2018
Training advice:
Provide adequate information, instruction and training for operators.
Abbreviations and acronyms:

GHS:	Globally Harmonized System of Classification Labeling of Chemicals.
CAS:	Chemical Abstracts Service registration number.
NIOSH:	US National Institute for Occupational Safety and Health
OSHA:	US Occupational Safety and Health
LD50:	Lethal Dose, 50 percent kill
ITAT	International Air Transport Association
IMDG:	International Maritime Dangerous Goods
TSCA:	Toxic Substances Control Act,
IECSC:	Inventory of existing chemical substances in China

Disclaimer to reader:

The information in this SDS is provided all the relevant data fully and truly. However, the information is provided without any warranty on their absolute extensiveness and accuracy. This SDS was prepared to provide safety preventive measures for the users who have got professional training. The personal user who obtained this SDS should make independent judgment for the applicability of this SDS under special conditions. In these special cases, we do not assume responsibility for the damage