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MATERIAL SAFETY DATA SHEET

LITHIUM MANGANESE DIOXIDE (LI-MnO_2)
NON-RECHARGEABLE BUTTON BATTERY

1. Product Identification

Product Rechargeable? NO

Trade name: LITHIUM MANGANESE DIOXIDE (LI-MnO_2)

Model:

Button Type CR927, CR1025, CR1216, CR1220, CR1225, CR1616, CR1620, CR2016, CR2025, CR2032, CR2330, CR2430, CR2354, CR2450, CR2477, CR2477T

2. Composition & Information on Ingredients

Each cell consists of a hermetically sealed metallic container containing a number of chemicals and materials of construction of which the following could potentially be hazardous upon release.

Electrochemical system:

Formula: Mixture

Manganese Dioxide (MnO_2) (1313-13-9)	65-75%
Propylene Carbonate (PC) (108-32-7)	10-15%
Lithium (7439-93-2)	5-10%
Graphite, synthetic (7440-44-0)	5-10%
1,2-Dimethoxyethane (DME) (110-71-4)	1-10%
Lithium Perchlorate (7791-03-9)	<1.5%

Shell: made by stainless steel

Nominal Voltage: 3.0 Volt

3. Physical Data

Boiling point (°C):	PC-242, DME-85
Vapor pressure (mmHg):	PC-0.03, DME-61
Vapor Density (Air=1):	DME-3.1
Solubility in Water:	DME-complete, PC-moderate

Melting Point (°C):	Li-179, MnO_2-decomposes at 535, $LiCl_4$-236
Evaporation Rate: (Butyl Acetate=1)	DME-4.99
Appearance and Odor:	Lithium is a soft, silvery metal. MnO2 is a black powder. PC is a colorless, odorless liquid. DME is a colorless liquid with a sweet odor.

4. Hazards Identification

Do not short circuit, recharge, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the temperature range of the battery. Thermal degradation may produce hazardous fumes of manganese and lithium; oxides of carbon and other toxic by-products.

5. First Aid Measures

Inhalation	Respiratory (and eye) irritation may occur if fumes are released due to heat or an abundance of leaking batteries. Remove to fresh air. In severe cases obtain medical attention.
Skin Contact	Wash off skin thoroughly with clear and tepid water. Remove contaminated clothing and wash before reuse. In severe cases obtain medical attention.
Eye Contact	Irrigate thoroughly with clear and tepid water for at least 30 minutes. Obtain medical attention.
Ingestion	Consult a physician. Published reports recommend removal from the esophagus be done endoscopically (under direct visualization). Batteries beyond the esophagus need not be retrieved unless there are signs of injury to the GI tract or a large diameter battery fails to pass the pylorus. If asymptomatic, follow-up x-rays are necessary only to confirm passage of larger batteries. Confirmation by stool inspection is preferable under most circumstances. If mouth area irritation/burning has occurred, rinse the mouth and surrounding area with clear, tepid water for at least 15 minutes.
Further Treatment	All cases of eye contamination, persistent skin irritation and casualties who have swallowed this substance or been affected by breathing its vapors should be seen by a Doctor.

6. Fire Fighting Measures

Batteries may burst and release hazardous decomposition products when exposed to a fire situation.

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Extinguishing Media: As for surrounding area, Dry chemical, alcohol foam, water or carbon dioxide. For incipient fires, carbon dioxide extinguishers are more effective than water.

Firefighting Procedures: Cool fire-exposed batteries and adjacent structures with water spray from a distance. Use self-contained breathing apparatus and full protective gear.

7. Accidental Release Measures

Do not breathe vapors or touch liquid with bare hands. If the skin has come into contact with the electrolyte it should be washed thoroughly with water. Earth or sand should be used to absorb the exudation, seal leaking battery and earth

in a heavy duty polythene bag and dispose of as Special Waste.

8. Handling and Storage

Handling	Do not short circuit or expose to temperatures above the temperature rating of battery. Do not recharge, over-discharge, force discharge, immerse, puncture or crush. Replace all batteries in equipment at the same time. Do not carry batteries loose in pocket or bag. Install batteries in accordance with equipment instructions.
Storage	Store in a cool place but prevent condensation on cells and batteries. Elevated temperatures can result in shortened battery life and degrade performance. Do not store batteries in high humidity environments for long periods.

9. Exposure Controls & Personal Protection

Respiratory Protection	In all fire situations, use self-contained breathing
Hand Protection	In the event of leakage, wear gloves.
Eye Protection	Safety glasses are recommended during handling
Other	In the event of leakage, wear chemical apron.

Steps to be taken if material is released to the environment or spilled in the work area: Evacuate the area and allow vapors to dissipate. Increase ventilation. Avoid eye or skin contact. **DO NOT** inhale vapors. Clean-up personnel should wear appropriate protective gear. Remove spilled liquid with absorbent and contain for disposal.

10. Reactivity

Conditions to avoid: Do not heat, crush, disassemble, short circuit or recharge.
Incompatible Materials: Contents incompatible with strong oxidizing agents.
Hazardous reactions: Lithium metal reacts with water to produce highly flammable gasses.
Hazardous decomposition reactions: Toxic Fumes, and may form peroxides.
Hazardous decomposition products: Thermal degradation may produce hazardous fumes of manganese and lithium; oxides of carbon and other toxic by-products.

11. Toxicological Information

Signs & Symptoms	None, unless battery ruptures. In the event of exposure to internal contents, corrosive fumes will be very irritating to skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibrotic lung injury and membrane irritation.

Inhalation	Lung irritant.
Skin Contact	Skin irritant
Eye Contact	Eye irritant.
Ingestion	Poisoning if swallowed.
Medical Conditions Generally Aggravated by Exposure	In the event of exposure to internal contents, eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.

12. Ecological Information

Mammalian effects	None known at present.
Eco-toxicity	None known at present.
Bioaccumulation potential	Slowly Bio-degradable
Environmental fate	None known environmental hazards at present.

13. Disposal Considerations

No special precautions are required for small quantities. Large quantities of open batteries should be treated as hazardous waste. Dispose of in accordance with federal, state and local regulations. Do not incinerate, since batteries may explode at excessive temperatures.

14. Regulatory Information

Risk Phrases

Lithium	R14/15	Reacts violently with water, liberating extremely flammable gases.
	R34	Causes burns.
Manganese Dioxide	R20/22	Harmful by inhalation and if swallowed.
Lithium Perchlorate	R8	Contact with combustible material may cause fire.
	R36/37/38	Irritating to eyes, respiratory system and skin.
Tetrahydrofuran	R11	Highly Flammable
	R19	May form explosive peroxides.
	R36/37	Irritating to eyes and respiratory system.
Propylene Carbonate	R36	Irritating to the eyes.
1,2 Dimethoxyethane	R11	Highly Flammable
	R19	May form explosive peroxides
	R20	Harmful by inhalation

Safety Phrases

Lithium	S1/2	Keep locked up and out of reach of children.
	S8	Keep container dry
	S43	In case of fire, use Lith-X (Graphite based) fire extinguisher. Never use water
	S45	In case of accident or if you feel unwell, seek medical advice immediately.
Manganese Dioxide	S25	Avoid contact with eyes.
Lithium Perchlorate	S17	Keep away from combustible material.
	S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	S27	Take off immediately all contaminated clothing.
	S36/37	Wear suitable protective clothing and gloves.
	S38	In case of insufficient ventilation, wear suitable respiratory equipment.
Tetrahydrofuran	S2	Keep out of the reach of children.
	S16	Keep away from sources of ignition - No Smoking.
	S29	Do not empty into drains.
	S33	Take precautionary measures against static discharges.
Propylene Carbonate	S24/25	Avoid contact with skin and eyes.
1,2 Dimethoxyethane	S24/25	Avoid contact with skin and eyes.

15. Transport information

The transport of lithium batteries is regulated by the United Nations as detailed in the "Model Regulations on the Transport of Goods Ref. ST/SG/AC.10/1 - Revision 11 - 1999." Lithium manganese dioxide coin cells are not restricted for transport.

Individual Lithium manganese dioxide coin cells or lithium battery packs with less than 1.0 gram of lithium metal content are not restricted for transport.

16. Other Information

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable.

This information relates to the specific materials designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his particular use.

EEMB CO.,LTD.
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