

MATERIAL SAFETY DATA SHEET

SANYO Batteries

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Date of Preparation: 6/23/03

Section I — Product Identification

Product Name: Lithium Battery

Model: Cylindrical (Crimp) Type Cells Nominal Voltage: 3.0V

Chemical System: Manganese Dioxide Lithium Primary Designated for Recharge:
 Yes No

Section II — Composition / Information on Ingredients

IMPORTANT NOTE: The battery cell should not be opened or exposed to heat because exposure to the following ingredients contained within could be harmful under some circumstances.

Chemical Name	CAS No.	Concentration/ Concentration range	Classification and Hazard labeling
Manganese Dioxide	1313-13-9	35-45%	Specific hazards
Lithium metal	7439-93-2	3%*	Water prohibited
Mixture solvent of carbonate and ether	—	10-15%	Inflammability
Lithium Trifluoro methane sulphonate (LiCF ₃ SO ₃)	33454-82-9		—

* Weight of lithium per cell or battery: See table page 5.

Section III — Physical Data

Boiling point (°C): EC:248, BC:240, DME:85
Vapor pressure (mmHg): EC, BC<0.1, DME:61
Vapor Density (Air=1): EC-3.0, BC-4.0, DME:3.1
Solubility in Water: EC, BC:moderate, DME:complete
Specific Gravity (H₂O=1): MnO₂:5.03, EC:1.32, BC:1.15, DME:0.87
Li-0.54, LiCF₃SO₃:0.5~0.6 (bulk)
Melting Point (°C): Li-179, MnO₂:decomposes at 535, LiCF₃SO₃:430
Evaporation Rate (Butyl Acet.=1): DME:4.99

The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. SANYO ENERGY CORP. makes no warranty, expressed or implied, with respect to this information and disclaims all liabilities from reliance on it.

Appearance and Odor:

Lithium is a soft, silvery metal.
 MnO₂ is a black powder.
 EC, BC is a colorless, odorless liquid.
 DME is a colorless liquid with a sweet odor.

Section IV — Fire and Explosion Hazard Data

Flash Point (°C):	DME: -1
Extinguishing Media:	Water
Flammable Limits:	Not available
Special Fire Fighting Procedure:	In case of fire in an adjacent area, use water, CO ₂ or dry chemical extinguishers if cells are packed in their original containers since the fuel of the fire is basically paper products. For bulk quantities of unpackaged cells use LITH-X (Graphite Base). In this case, do not use water.

Section V - Reactivity Data

Stability:	Stable
Conditions to Avoid:	Do not heat, disassemble or charge.
Hazardous Decomposition or By-products:	N/A
Hazardous polymerization will not occur.	

Section VI - Health Hazard Data

Routes of Entry:	Inhalation	Yes
	Skin	Yes
	Ingestion	Yes

Health Hazards (Acute and Chronic):

These chemicals are contained in a sealed can. Risk of exposure occurs only if the battery is mechanically or electrically abused. The most likely risk is acute exposure when a cell vents.

DME is believed to be slightly to moderately toxic, and EC and BC are considered to be non-toxic but moderately irritating to the eyes. LiCF₃SO₃ is irritating to skin, eyes and mucous membranes. Contact of electrolyte and extruded lithium with skin and eyes should be avoided.

Carcinogenicity:

NTP: None

IARC Monograph: None

OSHA Regulated: None

Signs / Symptoms of Exposure:

DME may be a reproductive hazard. Lithium can cause thermal and chemical burns upon contact with the skin.

Medical Conditions Generally Aggravated by Exposure:

An acute exposure will not generally aggravate any medical condition.

Emergency and First Aid Procedures:

In case of skin contact with contents of battery, flush immediately with water. For eye contact, flush with copious amounts of water for 15 minutes. Do not inhale leaked material. If irritation persists, get medical help.

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Section VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled:

The preferred response is to leave the area and allow the batteries to cool and the vapors to dissipate. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.

Waste Disposal Method:

Dispose in accordance with appropriate regulations. Open cells should be treated as hazardous waste.

Precautions to be Taken in Handling and Storing:

Avoid mechanical or electrical abuse.

Other Precautions:

Batteries may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures. Do not short or install with incorrect polarity.

Section VIII - Control Measure

Respiratory Protection (Specify Type): Not necessary under conditions of normal use.

Ventilation: Not necessary under conditions of normal use.

Protective Gloves: Not necessary under conditions of normal use.

Eye Protection: Not necessary under conditions of normal use.

Other Protective Clothing or Equipment: Not necessary under conditions of normal use.

Section IX - Disposal

Lithium batteries are best disposed of as a non-hazardous waste when fully or mostly discharged. The Federal Environmental Protection Agency (EPA) (governed by the Resource Conservation and Recovery Act (RCRA)) do not list or exempt Lithium as a hazardous waste. However, if waste lithium batteries are still fully charged or only partially discharged, they can be considered a reactive hazardous waste because of significant amounts of unreacted, or unconsumed lithium remaining in the spent battery. The batteries must be neutralized through an approved secondary treatment facility prior to disposal as a hazardous waste (as required by the U.S. Land Ban Restrictions for the hazardous and Solid Waste Amendments of 1984.) Secondary treatment centers receive these batteries as manifested hazardous waste under code "D003 - reactive." Button cells are exempt because they contain so little lithium and therefore can be disposed of in the normal municipal waste stream. Use a professional disposal firm for disposal of mass quantities of undischarged lithium batteries.

DO NOT INCINERATE or subject battery cells to temperatures in excess of 212°F. Such treatment can cause cell rupture.

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Section X - Transportation

SANYO Lithium batteries are exempt from dangerous goods regulations and meet the exceptions of 49CFR Part 173.185(b). They are considered non-dangerous goods by the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA) because they meet all requirements of Special Provision A45. More information concerning shipping, testing, marking and packaging can be obtained from Labelmaster at <http://www.labelmaster.com>.

Separate Lithium batteries when shipping to prevent short-circuiting. They should be packed in strong packaging for support during transport.

Each SANYO cell or battery has been tested under provisions of the UN Manual of Tests and Criteria, Part III, Sub-section 38.3.

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WEIGHT OF LITHIUM FOR LITHIUM BATTERY

(Figure: Max. amount)

Battery Type		Model	Weight of Battery(g) /cell or Battery	Weight of Lithium(g) /cell or Battery
Primary Batteries	Coin-type	CR1220	0.8	0.01
		CR2016	1.7	0.03
		CR2025	2.5	0.05
		CR2032	3.0	0.06
		CR2430	4.0	0.08
		CR2450	6.9	0.16
	Cylindrical-type	CR-1/3N	3.3	0.06
		2CR-1/3N	9.1	0.12
		CR15270	11.0	0.33
		CR14500	17.4	0.62
		CR15400	17.0	0.54
		CR17335	16.0	0.57
		CR2	11.0	0.33
		CR123A	17.0	0.57
		CR-V3	38.0	1.24
		CR-P2	37.0	1.14
		2CR5 (CR15400x2)	40.0	1.08
		2CR5 (CR17335x2)	38.0	1.14
		CR17335E-R	16.0	0.55
		CR17450E-R	22.0	0.82
		CR17335HE-R	16.0	0.47
	CR17450HE-R	22.0	0.71	
	Cylindrical-type (SE series)	CR14250SE (SE-R)	9.0	0.26
		CR12600SE	15.0	0.48
		CR17335SE (SE-R)	17.0	0.49
		CR17450SE (SE-R)	22.0	0.72
		CR23500SE (SE-R)	42.0	1.52
Secondary Batteries	ML series	ML414	0.07	0.0004
		ML414R	0.07	0.0007
		ML414RU	0.08	0.0007
		ML414RU2	0.08	0.0008
		ML421	0.10	0.0009
		ML614	0.16	0.0012
		ML614R	0.19	0.0012
		ML621	0.22	0.0038
		ML1220	0.80	0.009
		ML2016	1.80	0.016
		ML2020	2.20	0.024
		ML2430	4.10	0.048
	NBL series	NBL414	0.07	0.0004
		NBL414R	0.08	0.0007
		NBL621	0.23	0.0038

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