PRODUCT INFORMATION AND DATA SHEET

This product is a manufactured article as described in 29 CFR 1910.1200 and is not subject to OSHA's Hazard Communication Standard requirements for preparation of material safety data sheets (MSDS).

SANYO Batteries
SANYO Energy (USA) Corp.
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www.sanyobatteries.com

Manufacturer's Name
SANYO Electric Co., Ltd.
Tokonabe-Cho Kasai-City
Hyogo, 675-2332, Japan
Telephone No.: 0790-43-2043

In case of emergency contact:
CHEMTREC at (800) 424-9300

Section I – Product Information

Product: Lithium Polymer Cell (Robust type)
Designated for Recharge? _X_ Yes ___ No

Product Code: Aluminum laminate type cell. UPF Series.

Section II – Composition / Information on Ingredients

- Substance or preparation: Preparation
- Information about the chemical nature of product:

<table>
<thead>
<tr>
<th>Common chemical name / General name</th>
<th>CAS number</th>
<th>Concentration / Concentration range</th>
<th>Classification and hazard labeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium Cobaltate (LiCoO2)</td>
<td>12190-79-3</td>
<td>10-20%</td>
<td>-</td>
</tr>
<tr>
<td>Lithium Manganate (LiMn2O4)</td>
<td>12057-17-9</td>
<td>10-20%</td>
<td>-</td>
</tr>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>10-40%</td>
<td>-</td>
</tr>
<tr>
<td>Graphite (Natural graphite)</td>
<td>7782-42-5</td>
<td>10-20%</td>
<td>-</td>
</tr>
<tr>
<td>(Artificial graphite)</td>
<td>7740-44-0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>5-10%</td>
<td>Sensitization of the skin group No.2</td>
</tr>
<tr>
<td>Polymer electrolyte</td>
<td>-</td>
<td>5-20%</td>
<td>Inflammable Solid</td>
</tr>
</tbody>
</table>

Section III – Physical Data

- Appearance
  - Physical state: Solid
  - Form: Prismatic (Laminated)
  - Color: Metallic color
  - Odor: No odor
- pH: NA
- Specific temperatures/temperature ranges at which changes in physical state occur. There is no useful information for the product as a mixture.
- Flash point: NA
- Explosion properties: NA
- Density: NA
- Solubility, with indication of the solvent(s): Insoluble in water
### Section IV – Fire and Explosion Hazard Data

- **Suitable extinguishing media**: Plenty of water, carbon dioxide gas, nitrogen gas, chemical powder fire extinguishing medium and fire foam.
- **Specific hazards**: Corrosive gas may be emitted during fire.
- **Specific methods of fire-fighting**: When the battery burns with other combustibles simultaneously, take fire extinguishing method which corresponds to the combustibles. Extinguish a fire from the windward as much as possible.
- **Special protective equipment for firefighters**:
  - Respiratory protection: Respiratory equipment of a gas cylinder style or protection-against-dust mask
  - Hand protection: Protective gloves
  - Eye protection: Goggle or protective glasses designed to protect against liquid splashes
  - Skin and body protection: Protective clothes

### Section V – Health Hazard Data

For the battery cell, chemical materials are stored in a hermetically sealed Aluminum laminate case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials leakage.

However, if exposed to a fire, added mechanical shocks, decomposed, or added electric stress by misuse the cell case will be breached and hazardous materials may be released. Moreover, if heated strongly by the surrounding fire, acrid gas may be emitted.

- **Most Important Hazard and Effects**
  - **Human health effects**:
    - **Inhalation**: The steam of the electrolyte has an anesthesia action and stimulates a respiratory tract.
    - **Skin contact**: The steam of the electrolyte stimulates a skin. The electrolyte skin contact causes a sore and the stimulation on the skin.
    - **Eye contact**: The steam of the electrolyte stimulates eyes. The electrolyte eye contact causes a sore and the stimulation on the eye. Inflammation of the eyes may occur.
  - **Environmental effects**: Since a battery cell remains in the environment, do not throw out it into the environment.

- **Specific hazards**: If the electrolyte contacts with water, it may generate detrimental hydrogen fluoride. Since the leaked electrolyte is inflammable liquid, do not bring close to fire.

### Section VI – First Aid Measures

**Spilled internal cell materials**

- **Inhalation**: Make the victim blow his/her nose, gargle. Seek medical attention if necessary.
- **Skin contact**: Remove contaminated clothes and shoes immediately. Immediately wash extraneous matter or contact region with soap and plenty of water.
- **Eye contact**: Do not rub eyes. Immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention.

**A battery cell and spilled internal cell materials**

- **Ingestion**: Make the victim vomit. Immediately seek medical attention.
Section VII – Toxicological Information

Lithium cobaltate - LiCoO2, Lithium Manganate - LiMn2O4
- Acute toxicity: No applicable data.
  - Reference cobalt: LDLo, oral - Guinea pig 20mg/kg
    manganese: LD50, oral - Guinea pig 9000mg/kg
- Local effects: Unknown.
- Sensitization: The nervous system of respiratory organs may be stimulated sensitively.
- Chronic toxicity/Long term toxicity:
  - By the long-term or repetitive inhalation of coarse particulate of Manganese Oxide (MnO2), lungs and nervous system may be affected; bronchitis, pneumonia, nerve disease or nerve mental disorder (manganese poisoning) may be caused.
  - By the long-term inhalation of coarse particulate or vapor of cobalt, it is possible to cause the serious respiratory-organs disease. Skin reaction or a lung disease for allergic or hypersensitive person may be caused.
- Skin causticity: Although it is very rare, the rash of the skin and allergic erythema may result.

Aluminum
- Local effects: Aluminum itself has no toxicity. When it goes into a wound, dermatitis may be caused.
- Chronic toxicity/Long term toxicity: By the long-term inhalation of coarse particulate or fume, it is possible to cause lung damage (aluminum lungs).

Graphite
- Acute toxicity: Unknown.
- Local effects: When it goes into one’s eyes, it stimulates one’s eyes; conjunctivitis, thickening of corneal epithelium or edematous inflammation palpebra may be caused.
- Chronic toxicity/Long term toxicity:
  - Long-term inhalation of high levels of graphite coarse particulate may cause lung disease or a tracheal disease.
- Carcinogenicity:
  - Graphite is not recognized as a cause of cancer.

Copper
- Acute toxicity:
  - 60-100mg sized coarse particulate causes a gastrointestinal disturbance with nausea and inflammation.
    TDLo, hypodermic - Rabbit 375mg/kg
- Local effects:
  - Coarse particulate stimulates nose and tracheal.
    When it goes into one’s eyes, reddening and pain may occur.
- Sensitization: Sensitization of the skin may be caused by long-term or repetitive contact.
- Reproductive toxicity: TDLo, oral - Rat 152mg/kg

Organic Electrolyte
- Acute toxicity:
  - LD50, oral - Rat 2,000mg/kg or more
- Local effects: Unknown.
- Skin irritation study: Rabbit – Mild
- Eye irritation study: Rabbit - Very severe
Section VIII – Reactivity Data

**Stability:** Stable under normal conditions of use

**Conditions to Avoid:** Hazardous reactions occurring under specific conditions

- Conditions to avoid: When cell is exposed to an external short-circuit, crushes, deformation, high temperature above 100 degree C, it will cause heat generation and ignition. Avoid direct sunlight and high humidity.

- Materials to avoid: Conductive materials, water, seawater, strong oxidizers and strong acids.

- Hazardous decomposition products: Acrid or harmful gas is emitted during fire.

Section IX – 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:** Open cells should be disposed of in accordance with local regulations.

**Precautions to be Taken in Handling and Storing:** Avoid mechanical or electrical abuse. Batteries may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures. Do not short or install with incorrect polarity. In the case of charging, use only dedicated charger or charge according to the conditions specified by Sanyo.

**Storage:** Avoid direct sunlight, high temperature, high humidity. Store in cool place (temperature: -20 ~ 35 degree C, humidity: 45 ~ 85%).

Section X – Exposure Controls / Personal Protection Measures

- **Engineering measures** are not necessary during normal use and conditions. In case of internal cell materials' leakage, operate the local exhaust or improve ventilation.

- **Control parameters**

<table>
<thead>
<tr>
<th>Common chemical name / General name</th>
<th>ACGIH (2002)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TLV-TWA</td>
</tr>
<tr>
<td>Lithium Manganate (LiMn2O4)</td>
<td>0.2mg/m3 (as manganese)</td>
</tr>
<tr>
<td>Lithium Cobaltate (LiCoO2)</td>
<td>0.02mg/m3 (as cobalt)</td>
</tr>
<tr>
<td>Aluminum</td>
<td>10mg/m3 (metal coarse particulate) 5mg/m3 (inflammable powder) 5mg/m3 (weld fume)</td>
</tr>
<tr>
<td>Carbon (Natural graphite) (Artificial graphite)</td>
<td>2mg/m3 (inhalant coarse particulate)</td>
</tr>
<tr>
<td>Copper</td>
<td>0.2mg/m3 (fume) 1.0mg/m3 (a coarse particulate, Mist)</td>
</tr>
<tr>
<td>Polymer electrolyte</td>
<td>-</td>
</tr>
</tbody>
</table>

ACGIH: American Conference of Governmental Industrial Hygienists, Inc.

TLV-TWA: Threshold Limit Value-Time Weighted Average concentration

BEI: Biological Exposure Indices

- **Personal protective equipment**

  Respiratory protection: Respirator with air cylinder, dust mask
  Hand protection: Protective gloves
  Eye protection: Goggle or protective glasses designed to protect against liquid splashes
  Skin and body protection: Working clothes with long sleeve and long trousers
Section XI – Transportation

Sanyo lithium cells and batteries are not subject to the requirements of the U.S. hazardous materials regulations pursuant to 49 CFR 173.185(b), IATA Dangerous Goods Regulations pursuant to Special Provision A45, and IMDG Code pursuant to Special Provision 188. Each Sanyo cell or battery has been tested under provisions of the UN Manual of Tests and Criteria, Part III, Sub-section 38.3. If Sanyo lithium cells are used to construct battery packs, the assembler of that battery is responsible to ensure it has been tested in accordance with the requirements contained in the UN Manual of Tests and Criteria and shipped in accordance with applicable regulations.

Batteries must be packaged and offered for transportation in a manner that prevents the dangerous evolution of heat (for example, by the effective insulation of exposed terminals) and protects against short circuits.

Section XII – Recycling and Disposal

SANYO encourages battery recycling. Our lithium polymer batteries are recyclable through the Rechargeable Battery Recycling Corporation's (RBRC) Charge Up to Recycle! Program. For information call 1-800-8-BATTERY or see their website at www.rbrc.org. Lithium polymer batteries must be handled in accordance with all applicable state and federal laws and regulations.

DO NOT INCINERATE or subject battery cells to temperatures in excess of 212° F. Such treatment can vaporize the liquid electrolyte causing cell rupture. Incineration may result in cadmium emissions.

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.