

## Safety data sheet for chemical products (SDS)

### 1. PRODUCT AND COMPANY IDENTIFICATION

- Product name : Cylindrical Nickel Cadmium Battery
- Company name : SANYO Electric Co., Ltd. Mobile Energy Company
- Address : 222-1 kaminaizen, Sumoto City, Hyogo, Japan
- Telephone number : +81-799-24-4111
- Telefax number : +81-799-23-2995
- Emergency telephone number : [Weekday] +81-799-23-2881  
[Night and holiday] +81-799-24-4131

### 2. COMPOSITION / INFORMATION ON INGREDIENTS

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

Common chemical name / General name	CAS number	Concentration / Concentration range	Classification and hazard labelling
Nickel, Nickel Compounds	7440-02-0	15-40%	-
Cadmium, Cadmium Compounds	7440-43-9	10-40%	-
Cobalt Compounds	7440-48-4	0-3%	-
Iron	7439-89-6	20-65%	-
Potassium Hydroxide	1310-58-3	0-5%	Corrosive substance
Sodium Hydroxide	1310-73-2		
Lithium Hydroxide	1310-65-2		

### 3. HAZARDS IDENTIFICATION

For the battery cell, chemical materials are stored in a hermetically sealed metal 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, added electric stress by misuse, the gas release vent will be operated. The battery cell case will be breached at the extreme. Hazardous materials may be released.

Moreover, if heated strongly by the surrounding fire, acrid or harmful fume may be emitted.

- Most important hazard and effects

Human health effects:

Inhalation: The electrolyte inhalation affects the respiratory tract membrane and the lungs. Cadmium fume may cause a cough, chest pain and dyspnea. Bronchitis and pneumonia will be occurred. Probably, it is carcinogen.

Skin contact: The electrolyte skin contact affects the skin seriously and may cause dermatitis.

Eye contact: The electrolyte leaked from the battery cell is strong alkali. When it goes into an eye, the cornea may be affected and it may lead to blindness.

Ingestion: The electrolyte ingestion irritates the mouth and the throat seriously results in vomiting, nausea, hematemesis, stomach pains and diarrhea.

Environmental effects:

Since a battery cell remains in the environment, do not throw out it into the environment.

#### 4.FIRST-AID MEASURES

##### **Internal cell materials of an opened battery cell**

- Inhalation :  
Cover the victim in a blanket, move to the place of fresh air and keep quiet. Seek medical attention immediately. When dyspnea (breathing difficulty) or asphyxia (breath-hold), give artificial respiration immediately.
- Skin contact :  
Remove contaminated clothes and shoes immediately. Wash the adherence or contact region with soap and plenty of water. Seek medical attention immediately.
- Eye contact :  
Immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention immediately.

##### **A battery cell and internal cell materials of an opened battery cell**

- Ingestion :  
Do not induce vomiting. Seek medical attention immediately.
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#### 5.FIRE-FIGHTING MEASURE

Although a battery cell is not flammability, in case of fire, move it to the safe place quickly. The following measures are taken when it cannot be moved.

- Suitable extinguishing media: Dry sand, chemical powder fire extinguishing medium.
  - Specific hazards: Acrid or harmful fume is emitted during fire.
  - Special protective equipment for firefighters : Protective equipment written in Section 8.
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#### 6.ACCIDENTAL RELEASE MEASURES

Internal cell materials, such as electrolyte leaked from battery cell, are carefully dealt with according to the followings.

- Personal precautions :  
Forbid unauthorized person to enter. Remove leaked materials with protective equipment written in Section 8.
  - Environmental precautions: Do not throw out into the environment.
  - Method of cleaning up :  
Dilute the leaked electrolyte with water and neutralize with diluted sulfuric acid. The leaked solid is moved to a container. The leaked place is fully flushed with water.
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#### 7.HANDLING AND STORAGE

- Handling  
Technical measures  
Prevention of user exposure: Not necessary under normal use.  
Prevention of fire and explosion: Not necessary under normal use.  
Precaution for safe handling: Do not damage or remove the external tube.  
Specific safe handling advice: Never throw out cells in a fire or expose to high temperatures. Do not soak cells in water and seawater. Do not expose to strong oxidizers. Do not give a strong mechanical shock or throw down. Never disassemble, modify or deform. Do not connect the positive terminal to the negative terminal with electrically conductive material. In the case of charging, use only dedicated charger or charge according to the conditions specified by Sanyo.
  - Storage  
Technical measures  
Storage conditions (suitable to be avoided): Avoid direct sunlight, high temperature, high humidity.  
Store in cool place (temperature : -30 ~ 35 degree C, humidity : 45 ~ 85%).  
Incompatible products: Conductive materials, water, seawater, strong oxidizers and strong acids  
Packing material (recommended, not suitable): Insulative and tear-proof materials are recommended.
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**8.EXPOSURE CONTROLS / PERSONAL PROTECTION**

## • Engineering measures :

No engineering measure is necessary during normal use. In case of internal cell materials' leakage, the information below will be useful.

## • Control parameters

Common chemical name / General name	ACGIH(2005)	
	TLV-TWA	BEI
Nickel,Nickel Compounds	(As Ni) Metal : 1.5mg/m <sup>3</sup> Soluble compounds : 0.1mg/m <sup>3</sup> Insoluble compounds : 0.2mg/m <sup>3</sup>	-
Cadmium,Cadmium Compounds	(As Cd) Simple substance : 0.01mg/m <sup>3</sup> Compounds : 0.002mg/m <sup>3</sup>	In blood : 5 micro g/l
Cobalt Compounds	(As Co) 0.02mg/m <sup>3</sup>	In blood : 1 micro g/l
Potassium Hydroxide	-	-
Sodium Hydroxide	-	-
Lithium Hydroxide	-	-

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: Protective mask

Hand protection: Protective gloves

Eye protection: Protective glasses designed to protect against liquid splashes

Skin and body protection: Working clothes with long sleeve and long trousers

- A battery cell is not applied to Toxic Substances Control Act (TSCA), because it is not a chemical substance but an article.

**9.PHYSICAL AND CHEMICAL PROPERTIES**

## • Appearance

Physical state: Solid

Form: Cylindrical

Color: Metallic color (without tube)

Odour: No odour

## • 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

**10.STABILITY AND REACTIVITY**

## • Stability : Stable under normal use

## • Hazardous reactions occurring under specific conditions

By misuse of a battery cell or the like, oxygen or hydrogen accumulates in the cell and the internal pressure rises. These gases may be emitted through the gas release vent. When fire is near, these gases may take fire.

When a battery cell is heated strongly by the surrounding fire, acrid or harmful fume may be emitted.

## • Conditions to avoid : Direct sunlight, high temperature and high humidity

## • Materials to avoid : Conductive materials, water, seawater, strong oxidizers and strong acids

## • Hazardous decomposition products: Acrid or harmful fume is emitted during fire.

## 11. TOXICOLOGICAL INFORMATION

There is no data available on the product itself. The information of the internal cell materials is as follows.

### **Nickel, Nickel Compounds**

- Acute toxicity: Unknown.
- Local effects :  
Inhalation of dust particles causes a cough. Metallic nickel and nickel salt causes allergic erythema in skin contact and irritates conjunctiva and cornea in eye contact.
- Sensitization :  
Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged contact with skin may cause skin sensitization.
- Chronic toxicity/Long term toxicity :  
Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. The substance may have effects on the nasal sinuses, resulting in inflammation and ulceration.
- Carcinogenicity :  
ACGIH: (Metal) A5 – Not suspected as a human carcinogen  
ACGIH: (water-soluble compounds) A4 – Not classified as a human carcinogen obviously  
ACGIH: (Insoluble compounds) A1 – Confirmed human carcinogen  
NIOSH: Potential occupational carcinogen  
NTP: Reasonably anticipated to be human carcinogen  
IARC: (Metal) Group 2B Possibly carcinogenic to human  
IARC: (Compounds) Group 1 carcinogenic to human

### **Cadmium, Cadmium Compounds**

- Acute toxicity : Unknown.
- Local effects :  
Oral ingestion causes acute gastroenteritis. Inhalation of the dust and fume causes a cough, chest pain, and dyspnea. Bronchitis and pneumonia may be occurred. Furthermore, it may cause headache, dizziness, loss of appetite, and weight reduction. Moreover, pulmonary edema, kidney dysfunction, born disease, and proteinuria may occur.  
Symptoms may be delayed. Rest and periodic medical observation are essential.
- Chronic toxicity/Long term toxicity :  
Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys , resulting in proteinuria and kidney dysfunction.
- Carcinogenicity :  
ACGIH : A2 – Suspected human carcinogen  
NIOSH : potential occupational carcinogen  
NTP : Known to be a human carcinogen  
IARC : Group 1 carcinogenic to human
- Reproduction Toxicity :  
The result of animal experiments gives some indication of the possibilities of affecting human reproduction.

### **Cobalt Compounds**

- Acute toxicity: Unknown.
- Local effects :  
Oral ingestion in excess of cobalt salt causes face flush with antherma, reversible difficulty of hearing, the kidney dysfunction, hypertrophied thyroid gland, loss of appetite, nausea and vomiting.  
Inhalation of metallic cobalt dust or fume (Cobalt oxide) affects respiratory tract membrane. Bronchitis and pneumonia will be caused in excess of inhalation.  
Skin contact of metallic cobalt or cobalt salt causes allergic erythema and popular eczema.
- Metallic cobalt or cobalt salt irritate conjunctiva and cornea in eye contact.
- Sensitization: Repeated or prolonged contact may cause skin sensitization.
- Chronic toxicity/Long term toxicity :  
Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. The substance may have effects on the heart, resulting in cardiomyopathy.
- Carcinogenicity :  
ACGIH: A3 –Confirmed animal carcinogen but relevance to human carcinogen is unknown  
IARC: Group 2B Possibly carcinogenic to human

**Potassium Hydroxide, Sodium Hydroxide, Lithium Hydroxide**

- Acute toxicity: Unknown.
  - Local effects :
    - Oral ingestion irritates a mouth and a throat. Oral ingestion causes nausea, vomiting, hematemesis, stomach pains and diarrhea. Oral ingestion causes bronchial infection, pneumonia and gastritis.
    - Inhalation of dust or mist irritates respiratory tract. Inhalation of dust or mist may cause pneumonia and pulmonary edema.
    - Skin contact affects the skin seriously and may cause dermatitis.
  - Eye contact affects the cornea and causes corneal ulcer. It may lead to blindness.
  - Chronic toxicity/Long term toxicity: Repeated or prolonged contact with skin may cause dermatitis.
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**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.
  - Bioaccumulation :
    - Cadmium bioaccumulation occurs in plants and marine food in human food chain.
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**13.DISPOSAL CONSIDERATIONS**

- 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 them, dispose them as industrial wastes subject to special control.

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**14.TRANSPORT INFORMATION**

In the case of transportation, confirm no leakage and no over-spill from a container. Take in a cargo of them without falling, dropping and breakage. Prevent collapse of cargo piles and wet by rain. The container must be handled carefully. Do not give shocks that result in a mark of hitting on a cell. Please refer to Section 7-HANDLING AND STORAGE also.

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**15.REGULATORY INFORMATION**

- Regulations specifically applicable to the product :
    - Wastes Management and Public Cleaning Law (Japan)
    - Law for Promotion Effective Utilization of Resources (Japan)
    - Mercury-containing and Rechargeable Battery Management Act (USA)
    - Commission Directive 93/86/EEC, 91/157/EEC, 98/101/EC (EU)
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**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.
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• Reference

Chemical substances information: Japan Advanced Information center of Safety and Health  
International Chemical Safety Cards (ICSCs):  
International Occupational Safety and Health Information Center (CIS)  
2005 TLVs and BEIs : American Conference of Governmental Industrial Hygienists (ACGIH)  
NIOSH CARCINOGEN LIST: National Institute for Occupational Safety and Health (NIOSH)  
The Ninth Report on Carcinogen: National Toxicology Program (NTP)  
IARC Monographs Program on the Evaluation of Carcinogenic Risks to Humans:  
International Agency for Research on Cancer (IARC)

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Prepared and approved by  
SANYO Electric Co., Ltd.  
Mobile Energy Company  
Alkaline Battery Division  
Alkaline Engineering Department