

## Safety Data Sheet (SDS)

### 1. Chemical Product and Company Identification

Product name : Electrolyte for Nickel Cadmium battery for railway (Potassium Hydroxide)  
 Information on company  
 Company name : THE FURUKAWA BATTERY CO., LTD  
 Address : No.2-4-1 HOSHIKAWA, HODOGAYA-KU, YOKOHAMA, KANAGAWA, JAPAN  
 Department in charge : Environmental promotion  
 Phone number : 81-45-336-5055  
 Fax number : 81-45-333-2534  
 Recommended use of the chemical and restrictions on use : This product is the electrolyte of Nickel Cadmium battery.  
 Please do not use for except to be filled in Nickel Cadmium battery.

### 2. Hazards Identification

GHS classification	Potassium Hydroxide	Hydroxide Lithium
<b>Health hazards</b>		
Acute toxicity (Oral)	Category 4	Classification not possible
Acute toxicity (Inhalation: Dusts and mists)	Classification not possible	Category 3
Skin corrosion/ irritation	Category 1B	Category 1
Serious eye damage/ eye irritation	Category 1	Category 1
Reproductive toxicity	Classification not possible	Category 1A
Specific target organ toxicity (Single exposure)	Category 1 (respiratory organs)	Category 1 (respiratory tract)
Specific target organ toxicity (Repeated exposure)	Category 1 (respiratory organs)	Classification not possible
Aspiration hazard	Category 1	Classification not possible

※Regard to physical and chemical hazards, health hazards, environmental hazards, the classification not mentioned above is 'Not applicable', 'Classification not possible' or 'Not classified' currently.

#### GHS label elements:

##### Pictogram



##### Signal words

: Danger

##### Hazard statements

: Toxic if swallowed.  
 Causes severe skin burns and eye damage.  
 Causes damage to organs (respiratory organ)  
 Causes damage to organs through prolonged or repeated exposure (respiratory organ system).  
 May be fatal if swallowed and enters airways

##### Precautionary statements

###### Prevention

: Do not breathe gas/mist/ vapours /spray.  
 Wash hands thoroughly after handling.  
 Do not eat, drink or smoke when using this product.  
 Wear protective gloves/protective clothing/eye protection/face protection.

###### Response

: Wash contaminated clothing before reuse.  
 IF INHALED: Remove person to fresh air and keep comfortable for breathing.  
 IF exposed or concerned: Call a doctor.  
 IF exposed or concerned: Get medical advice/attention if you feel unwell.  
 IF SWALLOWED: Rinse mouth. Do not induce vomiting.

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

If in eyes: Rinse cautiously with water for at least 15minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.

If swallowed, if on skin (or hair), if inhaled, if in eyes, immediately call a doctor.

Storage  
Disposal

: Store locked up.

: Entrust disposal of contents/container to the professional disposal contractor who has received the permission of the prefectural governor.

**Other risks/hazards**

: No information.

### 3. Composition/Information on Ingredients

Material		Approximate % by Wt. or Vol.	CAS #
Components	Chemical Formula		
Potassium Hydroxide	KOH	16-20	1310-58-3
Hydroxide Lithium	LiOH	<2	1310-65-2
Water	H <sub>2</sub> O	80-84	7732-18-5

Specific gravity:1.18

### 4. First-aid Measures

If inhaled

: Remove person to fresh air, keep comfortable for breathing.  
Get medical advice/attention.

If on skin

: Take off or remove immediately all contaminated clothing. Rinse skin with water/ shower.

If in eyes

If skin irritation or skin burns occurs, get medical advice/attention.

: Open the eyelids with your fingers, and wash with running water for at least 15 minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.

Get medical advice/attention.

If swallowed

: Immediately call a doctor.

Rinse mouth.

Do not induce vomiting.

Get medical advice/attention.

Most important symptoms/effects,  
acute and delayed

: Burning sensation, sore throat, cough, breathlessness, shortness of breath, redness, pain, blurred vision, blisters, severe skin burns, severe burns, abdominal pain, headache, nausea, shock or collapse, vomiting.

Protection for first-aiders

: Rescuers wear suitable protective equipment such as rubber gloves and tight-fitting safety goggles.

Special note to physician

: (Hydroxide Lithium)

Symptoms of lung edema often do not show until a few hours have passed, and it might aggravate if it does not take a rest. Therefore, it is necessary to take a rest and medical observation.

### 5. Fire Fighting Measures

Suitable extinguishing media

: Electrolyte itself does not have flammability and also not combustion supporting property. In Nickel Cadmium battery and electrolyte handling place and the like, extinguish fire using dry chemical or water when fire occurs.

Specific fire fighting method	: Move the container from the fire area if it is not dangerous. After extinguishing the fire, continue to cool the container thoroughly with plenty of water. Immediate move the movable container to safe place when fire occurs in surrounding.
Protection for fire-fighters	: Extinguish fire from upwind. Wear appropriate respiratory protection or protective clothes for chemical when firefighting.

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## 6. Accidental Release Measures

Personal precautions, protective equipment and emergency measures	: Wear suitable protective equipment (gloves, protective glasses, protective clothing and the like), when processing the leakage. Do not touch or walk through the leakage. Do not breathe gas, mist, vapour and spray.
Precautions for the environment	: Be careful to not discharge the product into the rivers, sewer, and soil.
Method for containment and clean-up	: Collect it in an empty airtight container. Absorb by sprinkling misty water when the gas is generated.
Prevention of secondary hazards	: Immediately remove all ignition sources in the vicinity. Prepare fire extinguishing equipment just in case it is ignited.

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## 7. Handling and Storage

Handling	
Technical measures	: Take measure described in '8: Exposure Controls and Personal Protective Equipment', and wear appropriate protective equipment.
Cautions for Safety Handling	: Wash hands, face and the like thoroughly and gargle after handling. Do not eat, drink or smoke when using this product. Do not breathe gas/ mist/ vapours /spray. Avoid contact with eyes and skin. Wear protective gloves/protective clothing/eye protection/face protection.
Storage	
Storage condition	: Provide a ventilation and lighting required for storing and handling hazardous materials in the storage location. : Store locked up. Keep container tightly closed and store in a well ventilated and cool-dark place. Do not use fire in storage place. Keep away from oxidizing agents. : See '10. Stability and Reactivity'.
Packaging material	: Use the container regulated in the UN transport regulation.

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## 8. Exposure Controls and Personal Protective Equipment

Engineering controls	: Provide eyes wash facilities and safety shower in the handling and storage place. Provide local exhaust device, prevent discharge this product from the facilities or general ventilation to keep concentration levels in the air below the recommended control concentration/permissible concentration. When the mist is generated in the high heat process, provide local exhaust device to keep concentration levels in the air below the recommended control concentration/permissible concentration. When the gas is generated in the high heat process, provide local exhaust device to keep concentration levels in the air below the recommended control concentration/permissible concentration.
Personal protective equipment	
Respiratory protection	: Wear gas mask as necessary.
Hand protection	: Wear protective gloves.

Eye protection : Wear safety glasses, goggle type safety glasses, face protection and the like.

Skin and body protection : Wear impermeable protective clothing, protective apron and the like.

Hygiene measures : Do not eat, drink or smoke when handling.  
Wash hands thoroughly after handling.  
Protective equipment shall be inspected regularly according to the protective equipment checklist.

## 9. Physical and Chemical properties

	Potassium Hydroxide	Hydroxide Lithium
Physical state	Liquid	Liquid
Colour,	Colourless	Colourless
Odour	Odourless	Odorless
Melting point	(normal temperature)	
Boiling point, initial boiling point and boiling range	No information	No information
Flammability (solid, gas)	140°C	No information
Lower and upper explosion limit / flammability limit	Nonflammable	No information
Flash point	No information	No information
Auto-ignition temperature	No information	No information
Decomposition temperature	No information	No information
pH	13.5 ≤	12 ≤
Kinematic viscosity	No information	No information
Solubility	Miscible in water. Soluble in alcohol.	Miscible in Water and alcohol.
Partition coefficient; n-octanol/water (log value)	No information	No information
Vapour pressure	0.41 kPa (20°C)	No information
Density and/or relative density	1.4791 (20/4°C)	No information
Relative vapour density	No information	No information
Particle characteristics	No information	No information

## 10. Stability and Reactivity

Reactivity : (Potassium Hydroxide)  
Hydroxides precipitate from aqueous solutions of many metal salts.  
Fats are saponified to produce the fatty acids sodium and glycerin.

Chemical stability : (Potassium Hydroxide)  
Stable under normal conditions. It absorbs carbon dioxide in the air to produce potassium carbonate.  
(Hydroxide Lithium)  
Stable under recommended storage conditions.

Possibility of hazardous reactions : (Potassium Hydroxide)  
Generate heat vigorously when contact with acids.  
The chemical corrodes aluminium, tin, zinc, chromium, and their alloys, releasing combustible hydrogen gas.  
(Hydroxide Lithium)  
None under normal processing.

Conditions to avoid : Light, heat.

Incompatible materials : Acids, metals.

Hazardous decomposition products : (Potassium Hydroxide) Potassium oxide, hydrogen.  
(Hydroxide Lithium) Metal oxides.

## 11. Toxicological Information

### ○Potassium Hydroxide

Acute toxicity (Oral)	: Harmful if swallowed
Acute toxicity (Dermal)	: Classification not possible
Acute toxicity (Inhalation: Gases)	: No classification
Acute toxicity (Inhalation: Vapours)	: Classification not possible
Acute toxicity (Inhalation: Dusts and mists)	: Classification not possible
Skin corrosion/irritation	:Causes severe skin burns Potassium hydroxide: The substance (solid) is described to be corrosive. Exposure to human skin caused chemical burns (3rddegree). Battery electrolyte (25% solution of the substance) caused tissue corrosion associated with small perforation. In rabbit skin irritation tests, corrosiveness was observed. Thus, it was classified into category 1B.
Serious eye damage/eye irritation	:Causes serious eye damage Potassium hydroxide : Based on the statements that it caused irreversible damage to humans and that it was corrosive to rabbits, it was classified into category 1
Respiratory sensitization	:Classification not possible
Skin sensitization	:Classification not possible Potassium hydroxide: Skin sensitization studies in guinea pigs gave negative results. Potassium ion (K+) and hydroxide ion (OH-) exist in living organisms. Thus, it is unlikely that the substance causes skin sensitization. However, the classification was not possible because the details of the test are unknown and there is no human data.
Germ cell mutagenicity	: No classification Potassium hydroxide: There are no in vivo data on this substance. As for in vitro, a bacterial reverse mutation test and a mammalian cell chromosome aberration test were negative. In SIDS, the mutagenicity of this substance was evaluated from comprehensive information on this substance, sodium hydroxide, potassium chloride, and potassium carbonate. Based on this evaluation, It is stated in SIDS that these substances are not considered to be genotoxic.
Carcinogenicity	: Classification not possible.
Reproductive toxicity	: Classification not possible.
Specific target organ toxicity (single exposure)	:Causes damage to organs (respiratory organs) Potassium hydroxide: The substance acts as strong alkali on skin and mucosa, and inhalation exposure to dust or mist may cause upper respiratory tract irritation and tissue damages, leading to nasal septum damage and pulmonary edema. Thus, it was classified into category 1 (respiratory organs).
Specific target organ toxicity (repeated exposure)	: Causes damage to organs (respiratory organs) through prolonged or repeated exposure Potassium hydroxide: Human studies have shown that inhalation of the substance (dust, mist) causes upper airway inflammation, which may result in nasal septum ulceration as a chronic effect. However, there is no studies on airborne concentrations and incidence of lesions. Exposure to dust or mist of the substance may cause nasal septum lesions and irritation of the eyes and respiratory tract. Although there is not sufficient data, it is clear that the substance is alkaline and inhalation causes respiratory inflammation. Thus, the substance was classified into category 1 (respiratory organs)
Aspiration hazard	:May be fatal if swallowed and enters airways Potassium hydroxide: Studies show that in fatal cases of unintentional ingestion of the substance, the cause of death involves aspiration into the esophagus to trachea and pneumonia, and aspiration of alkali into airway causes fatal injuries to the larynx, trachea/bronchus, and lung. Thus, it was classified into category 1

Others	: No information.
○Hydroxide Lithium	
Acute toxicity (Oral)	: Classification not possible
Acute toxicity (Dermal)	: Classification not possible
Acute toxicity (Inhalation: Gases)	: Not classified (Not applicable)
Acute toxicity (Inhalation: Vapours)	: Classification not possible
Acute toxicity (Inhalation: Dusts and mists)	: Based on a LC50 value of 0.96 mg/L/4h for rats (Japan Society For Occupational Health (JSOH), Recommendations for allowable concentrations (1995)), the substance was classified into Category 3. Although saturated vapour pressure concentration is unknown, the test was considered to be conducted for dust due to its solid state (GHS definition) and high melting point (471 degC).
Skin corrosion/irritation	: Since the solution of the substance is highly alkaline with a pH of approximately 12 (50 degC, 50g/L) (GESTIS (access on Sep. 2009)) and there is a report of "highly corrosive, irritating to skin" (Japan Society For Occupational Health (JSOH), Recommendations for allowable concentrations (1995)), the substance was classified into Category 1.
Serious eye damage/eye irritation	: Since a solution of the substance is highly alkaline with a pH of approximately 12 (50 degC, 50g/L) (GESTIS (access on Sep. 2009)) and there is a report of "highly corrosive, droplet and vapour irritating to eye" (Japan Society For Occupational Health (JSOH), Recommendations for allowable concentrations (1995)), the substance was classified into Category 1.
Respiratory sensitization	: Classification not possible
Skin sensitization	: Classification not possible
Germ cell mutagenicity	: Classification not possible
Carcinogenicity	: Classification not possible
Reproductive toxicity	: There are no available data for the substance. However, it was reported that the therapeutic uses of lithium in 225 pregnant women resulted in 25 infants with congenital malformation, so lithium is contraindicated in women of childbearing potential (ACGIH (2001)). Additionally, lithium is classified into a teratogenic agent in "Chemically Induced Birth Defects" (Birth Defects 3rd. (2000)). Based on case reports of congenital heart disease in pregnant women taking lithium, teratogenicity for human is suggested in "Catalog of Teratogenic Agents" (Teratogenic 12th (2007)). From above information, the substance was classified into Category 1A.
Specific target organ toxicity (single exposure)	: The substance is highly alkaline and there is a report of "highly corrosive, droplet and vapour irritating to the upper respiratory tract and mucous membrane of oral cavity". In a rat test with inhalation exposure (dust) at concentration of 960 mg/m <sup>3</sup> /4h, necrotic inflammation of the pharynx and nose was observed (Japan Society For Occupational Health (JSOH), Recommendations for allowable concentrations (1995)). Since this effect correspond to Category 1 based on guidance value range and a inhalation LC50 value for rats (960 mg/m <sup>3</sup> ), the substance was classified into Category 1 (respiratory tract). The substance was determined as dust due to its solid state (GHS definition) and high melting point of 471 degC.
Specific target organ toxicity (repeated exposure)	: Classification not possible
Aspiration hazard	: Classification not possible
Others	: Classification not possible

## 12. Ecological Information

	Potassium Hydroxide	Hydroxide Lithium
Ecotoxicity		
Hazardous to the aquatic environment (acute)	: Classification not possible.	: Classification not possible.
Hazardous to the aquatic environment (chronic)	: Classification not possible.	: Classification not possible.
Persistence/degradability	: No information	: No information.
Bioaccumulation	: No information	: No information.
Mobility in soil	: No information	: No information.
Hazardous to the ozone layer	: Classification not possible.	: No information.
Other hazard	: No information.	: No information.

## 13. Precautions for Disposal

Residual wastes	: Before disposal, to be the low level hazard state, perform the process of detoxification, stabilization and neutralization and the like as much as possible. In the disposal, follow the relevant laws and regulations and the standards of the local government. Entrust disposal to industrial waste disposal contractor who has received the permission of prefectural governor, or if the local government is performing waste disposal, entrust them disposal.
Contaminated container and packages	: Recycle containers after cleaning up or dispose of properly in accordance with relevant laws and local regulations. If dispose the empty container, dispose after removing contents completely.

## 14. Transport Information

International regulations	
Inland transport	: Follow the regulation under ADR/RID.
Sea transport	: Follow the regulation under IMO.
Air transport	: Follow the regulation under ICAO/IATA.
UN number	: 2797 (Electrolyte (Alkaline))
UN class	: Corrosive substance /Class 8
Proper shipping name	: BATTERY FLUID, ALKALI
Packing group	: II
Marine pollutant	: Not applicable
Emergency response guideline number (North America)	: 154

## 15. Regulatory Information

TSCA (Toxic Substances Control Act)

Each component parts of battery is listed in the TSCA Registry as follows.

Components	Chemical Formula	TSCA Status
Potassium Hydroxide	KOH	Listed
Hydroxide Lithium	LiOH	Listed

## 16. Other Information

### Reference:

Globally Harmonized System of classification and labeling of chemicals, (6th ed., 2015), UN JIS Z 7253:2019

- 1) NITE GHS classification data.
- 2) SIDS
- 3) NITE CHRIP ([http://www.safe.nite.go.jp/japan/sougou/view/SystemTop\\_jp.faces](http://www.safe.nite.go.jp/japan/sougou/view/SystemTop_jp.faces))

### Notice:

The contents described in this SDS are prepared based on the data and information currently available to us. However, it does not intend to be any guarantees in regard to content, physical and chemical properties, hazards, etc.

Please handle this product in the responsibility of the user after referring to this SDS.

In addition, the precautions are intended for normal handling. Please use under implementing safety measures that are suitable for application/usage if you want to special handling.