

Product Safety Data Sheet (PSDS)

1. PRODUCT AND COMPANY IDENTIFICATION

Product name Nickel Metal Hydride Battery
 Chemical System Nickel/Metal Hydride
 Company name YUASA (TIANJIN) TECHNOLOGY Ltd.
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2. COMPOSITION/INFORMATION ON INGREDIENT

Components	Concentration range	CAS No.	Classification and hazard labelling
Nickel (powder)	20~30%	7440-02-0	
Nickel Hydroxide	15~40%	12054-48-7	
Cobalt Compounds	2~10%	7440-48-4	
Iron	10~30%	7439-89-6	
Manganese	1~5%	7439-96-5	
Mischmetal	8~15%	8049-20-5	
Aluminium	0.3~1%	7429-90-5	
Potassium Hydroxide	5~13%	1310-58-3	Corrosive substance
Sodium Hydroxide		1310-73-2	
Lithium Hydroxide		1310-65-2	

3. HAZARD IDENTIFICATION

The battery cell is contained in a hermetically-sealed case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, hazardous materials are fully contained inside the battery cell. However, The battery cell casing should not be breached or exposed to heat.

Effects of a Single (Acute) Overexposure:

Inhalation: During normal use inhalation is an unlikely route of exposure due to containment of hazardous materials within the battery case. However, should the batteries be exposed to extreme heat or pressures causing a breach in the battery cell case, exposure to the constituents may occur. Inhalation of cobalt dusts may result in pulmonary conditions.

Ingestion: If the battery case is breached in the digestive tract, the electrolyte may cause localized burns

Skin Absorption: No evidence of adverse effects from available data.

Skin Contact: Exposure to the electrolyte contained inside the battery may result in chemical burns. Exposure to the nickel may cause dermatitis in some sensitive individuals.

Eye Contact: Exposure to the electrolyte contained inside the battery may result in severe irritation and chemical burns.

Carcinogenicity:

Nickel has been identified NTP as reasonably anticipated to be a carcinogen. Cobalt has been identified by IARC as a 2B carcinogen.

Other Effects of Repeated (Chronic) Exposure:

Chronic overexposure to nickel may result in cancer; dermal contact may result in dermatitis in sensitive individuals.

Medical Conditions Aggravated by Overexposure:

A knowledge of the available toxicology information and of the physical and chemical properties of the material suggests that overexposure is unlikely to aggravate existing medical conditions.

4. FIRST AID MEASURES

Swallowing: Do not induce vomiting. Seek medical attention immediately.

Skin: If the internal cell materials of a leaking battery cell come into contact with the skin, immediately flush with water for at least 15 minutes and contact a physician.

Inhalation: If potential for exposure to fumes or dusts occurs, remove immediately to fresh air and seek medical attention.

Eyes: If the contents from an opened battery come into contact with the eyes, immediately flush eyes with water continuously for at least 15 minutes without rubbing and seek medical attention immediately.

5. FIRE-FIGHTING MEASURES

If fire or exposure occurs when batteries are being charged, disconnect power to charger.

Suitable Extinguish Media: Dry sand, Chemical powder fire extinguishing medium.

Products of Combustion: Oxides of carbon, metal; dense, toxic smoke; intense heat.

Protection of Firefighter: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products.

Special Fire Fighting Procedures: If the battery cell is being charged turn off electric power, in the event that the cell has been breached exposing electrode plates, monitor the area for a reoccurrence of the fire until all components have cooled to ambient temperature. Immediately cover the exposed components in a water bath to prevent spontaneous combustion of the plate materials.

6. ACCIDENTAL RELEASE MEASURES

Spill or Leak: Battery cell is sealed against electrolyte loss. Under normal handling, spillage of alkali electrolyte will not occur. However, battery may emit electrolyte or hydrogen gas if charging or discharging rates exceed manufacturer's recommendations or if battery has been breached.

Personal precautions: Use personal protection recommended in Section 8.

Methods for Containment: Move battery to well ventilated area to prevent hydrogen gas accumulation. If electrolyte leaks or spills, neutralize with a weak acid such as vinegar or citric acid before proper disposal. Dispose in accordance with applicable local, state and federal regulations.

7. HANDLING AND STORAGE

Handling: Accidental short circuit will bring high temperature elevation to the battery as well as shorten the battery life. Be sure to avoid prolonged short circuit since the heat can burn attendant skin and even rupture of the battery cell case. Batteries packaged in bulk containers should not be shaken. Metal covered tables or belts used for assembly of batteries into devices can be the source of short circuits; apply insulating material to assembly work surface. If soldering or welding to the case of the battery is required, consult Yuasa (Tianjin)Technology Ltd. representative for proper precautions to prevent seal damage or external short circuit.

Storage: Do not stack battery directly on another battery. Protect from physical damage and short circuits. Do not store batteries on electrically conductive surfaces. Store in cool place, elevated temperature may result in reduced battery life. Storage with temperature of 5~25 degree C and humidity of 45~85% are recommended.

8.EXPOSURE CONTROLS/PERSONAL PROTECTION**Exposure Guideline:**

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

Engineering Controls: Avoid charging batteries in areas where hydrogen gas can accumulate. Use local exhaust ventilation to maintain concentrations of hydrogen below the Lower Explosive Limit (L.E.L). Consult a qualified ventilation professional regarding the proper methods to collect and transport flammable gases in ventilation systems. Insure proper ventilation is present during battery disassembly to control occupation exposure to battery component particulate and electrolyte mist and vapor.

Eye/Face Protection: Wear ANSI approved safety glasses with side shields during normal use. Wear OSHA approved face shield with safety glasses during intentional disassembly.

Skin Protection: Wear nitrile butyl rubber, neoprene, or PVC gloves and protective clothing during battery component disassembly. Discard contaminated work clothing after one work day.

Respiratory protection: None required during normal use. Use appropriate NIOSH approved respirator if airborne dust or mist concentrations exceed the PEL or TLV during intentional disassembly.

General Hygiene Considerations: Practice good housekeeping and personal hygiene procedures. Do not smoke in the area where batteries are being charged, stored or tested. Wear proper personal protective equipment during battery charging and disassembly operations.

Other Equipment: Safety showers and eyewash stations should be present in work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Solid

Form: Cylindrical

Color: Metallic color (without tube)

Odor: odorless

pH: Not Applicable

Flash point: Not Applicable

Melting point: Not Applicable

Boiling point: Not Applicable

Freezing Point: Not Applicable

Density: Not Applicable

Evaporation Rate: Not Applicable

Vapor Pressure: Not Applicable

Vapor Density: Not Applicable

Solubility in water: Electrolyte is soluble. Remainder is insoluble.

10. STABILITY AND REACTIVITY

Stability: Stable at ambient

Conditions to avoid: Do not exceed manufacturer's recommendations for charging or use battery for an application for which it was not specifically designed. Do not electrically short.

Incompatible Materials: Avoid contact with acids and oxidizers.

Hazardous decomposition products: None under normal conditions. See Section 5 for decomposition products from thermal decomposition.

Possibility of Hazardous Reactions: Will not occur under normal conditions.

11. TOXICOLOGICAL INFORMATION

Under normal conditions of use, the risk of long-term exposure to the hazardous components is minimal. Prolonged inhalation of metal dusts or electrolyte mists may cause serious respiratory illness. The chronic effects of long-term exposure to nickel bearing alloys (nickel metal hydride) are currently unknown. According to NTP insoluble nickel compounds (nickel hydroxide) may reasonably be anticipated to be carcinogens, and an assessment by IARC concluded there was sufficient evidence that nickel and nickel compounds, as a group, but not necessarily as individual chemicals, were carcinogenic to humans. Cobalt compounds have been classified as carcinogens or potential carcinogens by OSHA and IARC.

Some toxicological information of materials contained in cell is described as below.

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

Cobalt Compounds:

*Acute toxicity: Unknown

*Local effects: Oral ingestion in excess of cobalt salt causes face flush with anthema, 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:

ICGIH: 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.

12. ECOLOGICAL INFORMATION

Generally this product is not expected to be harmful to the ecology.

13. DISPOSAL CONSIDERATIONS

Always dispose of in discharged condition. Nickel-containing waste or scrape is normally collected to recover nickel content. Contact battery manufacturer for recycling options. Properly dispose of other waste in accordance with applicable local, state and federal regulations.

14. TRANSPORT INFORMATION

YUASA sealed Nickel Metal Hydride batteries are considered to "dry cell" batteries and not subject to hazardous materials (dangerous goods) regulations for the purpose of transportation by the IMDG, U.S. DOT, ICAO, IATA, or IMO.

The IMDG requirement for sea shipping Nickel Metal Hydride batteries are contained in Special Provision 304 which states, "*Batteries, dry, containing corrosive electrolyte which will not flow out of the battery if the battery case is cracked are not subject to the provisions of this Code provided the batteries are securely packed and protected against short-circuits.*"

The only DOT requirement for shipping Nickel Metal Hydride batteries are contained in Special Provision 130 which states, "*Batteries, dry are not subject to the requirement of this subchapter when they are securely 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.*" A similar requirement is contained in CFR 173.21(c) of the U.S. DOT hazardous materials regulations.

The IATA Dangerous Goods Regulations contain a similar requirement in Special Provision A123 which state, "*This entries applies to Batteries, electric storage, not otherwise listed in Subsection 4.2 –List of Dangerous Goods. Examples of such batteries are alkali-manganese, zinc-carbon, nickel-metal hydride, and nickel-cadmium batteries. Any electrical battery or battery powered device having the potential of dangerous evolution of heat that is not the prepared so as to prevent a short-circuit (e.g. in the case of batteries, by the effective insulation of*

exposed terminals; or, in the case of equipment, by disconnection of the battery and protection of exposed terminals) is forbidden from transport."

Failure to comply with these requirements may result in substantial civil penalties.

Proper Shipping Description:

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 also refer to Section 7.

15. REGULATORY INFORMATION

SARA 313 Information: As an article, this battery and its contents are not subject to the requirements of Section 313 of the Emergency & community Right-to-Know Act of 1986.

16. OTHER INFORMATION

The data in this Product Safety Data Sheet relate to only specific designated herein and do not relate to use in combination with any other material or in any process. The information set forth herein is based on the present state of knowledge and current legislation. Any use of this data or information must be determined by the user to be in accordance with federal, state, local laws and regulations.

Explanation of Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standard Institute
BEI	Biological Exposure Indices
CAS	Chemical Abstracts Service
CFR	Code of Federal Regulation
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupation Safety and Health Administration
PEL	Permissible Exposure Limit
TLV-TWA	Threshold Limit Value-Time Weighted Average

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