



## Material Safety Data Sheet

### Section 1: Information of Manufacturer

Product name: Nickel Metal Hydride Battery

Nominal Voltage: 1.2V

Chemical system: Ni/MH

Designed for recharge: Yes No√

### Section 2: Hazardous Ingredients / Identity Information

MATERIALS	CAS#	APPROXIMATE PERCENT OF TOTAL WEIGHT (~%)
Aluminum	7429-90-5	< 2
Cobalt metal	7440-48-4	2.5-6.0
Cobalt oxide	1307-96-6	
Cobalt hydroxide	21041-93-0	
Lithium Hydroxide	1310-65-2	0-4
Manganese	7439-96-5	0-4
Lanthanum	7439-91-0	<13
Cerium	7440-45-1	
Neodymium	7440-00-8	
Praseodymium	7440-10-0	
Nickel hydroxide	12054-48-7	35-55
Nickel oxide	1313-99-1	
Nickel powder	7440-02-0	
Potassium Hydroxide	1310-58-3	<7
Sodium Hydroxide	1310-73-2	0-4
Zinc metal	7440-66-6	<3
Zinc oxide	1314-13-2	
Zinc hydroxide	20427-58-1	
Iron	7439-89-6	10-25
Other Non-hazardous	Water, Paper, Plastic and Other	Balance

**Section 3 : Physical / Chemical Characteristics**

Appearance :Solid, Cylindrical Shape, Metallic color	Odor: Odorless
pH: N.A.	Odor Threshold N.A.
Initial boiling point and boiling range:N.A.	Melting point/freezing point :N.A.
Evaporation rate : N.A.	Flash point N.A.
Vapor pressure :N.A.	Flammability (solid, gas)
Relative density: N.A.	Upper/lower flammability or explosive limit: N.A.
Solubility: N.A.	Vapor density : N.A.

**Section 4: Hazard classification****GHS Classification: N.A. GHS**

Under normal conditions of use, the battery is hermetically sealed. If the electrolyte is leaked, hazardous material may be released.

**Human Health Effects**

Inhalation: The electrolyte inhalation can cause respiratory irritation. It could be possibly carcinogen.

Skin contact: The electrolyte can cause skin irritation, chemical burns. Nickel compounds, cobalt and cobalt compounds can cause skin sensitization and an allergic contact dermatitis.

Eye contact: The electrolyte leaked from the battery cell is strong alkali, can cause severe irritation and chemical burns.

Ingestion: If the battery is swallowed and opened, or the electrolyte is ingested, the electrolyte irritates the mouth and the throat seriously, may lead to vomiting, nausea, hematemesis, stomach pains and diarrhea.

**Environmental Effects**

The battery cell remains in the environment. Do not throw it out into the environment.

**Specific Hazards**

As previously described.

**Section 5: Reactivity Data**

Stability	Stable under normal use
Possibility of hazardous reactions	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, acid 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.



**Section 6: Health Hazard Data**

There is no toxicity data for Nickel Metal Hydride Battery. Under normal conditions of use, the battery is non-toxic.

Route(s) of Entry Yes=(X)

Inhalation (N.A.)

Skin(N.A.)

Ingestion (N.A.)

**Section 7: First Aid Measures**

Inhalation	If electrolyte leakage occurs, 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	If electrolyte leakage occurs, remove contaminated clothes and shoes immediately. Wash the adherence or contact region with soap and plenty of water. Seek medical attention immediately.
Eye Contact	If electrolyte leakage occurs, immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention immediately.
Ingestion	If battery cell and electrolyte is ingested, do not induce vomiting or give food or drink. Seek medical attention immediately.

**Section 8: Fire and Explosion Hazard Date**

**Extinguishing Media:**

Dry sand, chemical powder fire extinguishing medium.

**Unusual Fire and Explosion Hazards:**

Acrid or harmful fume is emitted during fire.

**Special Protective equipment and Precautions for fire-fighters:**

Fire fighters should wear self-contained breathing apparatus. Burning nickel metal hydride batteries can produce toxic fumes including oxides of nickel, cobalt, aluminum, manganese, lanthanum, cerium, praseodymium, neodymium, and praseodymium.

Protective equipment written in Section VIII.

**Section 9: Accidental Release or Spillage**

Personal Precautions	Forbid unauthorized person to enter. Remove leaked materials with protective equipment written in Section VIII.
Environmental precautions	Do not throw out into the environment.
Containment and Clean 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.

**Section 10: Handling and Storage****Handling:**

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 Batteries.

**Storage:**

Storage conditions (suitable to be avoided): Avoid direct sunlight, high temperature, high humidity. The cells and batteries shall not be stored in high temperature, the maximum temperature allowed is

60°C for a short period during the shipment. Otherwise the cells may be leakage and can result in shortened cycle life.

Incompatible products: Conductive materials, water, seawater, strong oxidizers and strong acids  
Packing material (recommended, not suitable): insulated and tear-proof materials are recommended.

**Section 11: Exposure Controls / Personal Protection****Engineering Control**

No engineering measure is necessary during normal use. If internal cell materials are leaked, the information below will be useful.

**Exposure Control Limit**

Common Chemical Name / General Name	OSHA PEL	ACGIH TLV
Aluminum metal (as Al)	TWA 15 mg/m <sup>3</sup> (total) TWA 5 mg/m <sup>3</sup> (resp)	
Cobalt metal (As Co)	TWA 0.1 mg/m <sup>3</sup>	TWA 0.02 mg/m <sup>3</sup>
Lithium Hydroxide		
Manganese compounds	(Ceiling) 5 mg/m <sup>3</sup>	TWA 0.02 mg/m <sup>3</sup> (resp.)
Nickel, metal and insoluble compounds	(as Ni) TWA 1 mg/m <sup>3</sup>	Elemental: 1.5mg/m <sup>3</sup> (IHL); Insoluble inorganic compounds: 0.2mg/m <sup>3</sup> (IHL)
Potassium Hydroxide		
Sodium Hydroxide	2 mg/m <sup>3</sup> TWA	(Ceiling) 2 mg/m <sup>3</sup>
Zinc oxide	Respirable fraction: 5mg/m <sup>3</sup>	Respirable fraction: 2 mg/m <sup>3</sup>

TWA – Time Weighted Average

ACGIH TLV: American Conference of Governmental Industrial Hygienists Threshold Limit Value

OSHA PEL: Occupational Safety & Health Administration Permissible Exposure Limit.

**Section 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.

**Section 13: Disposal Method**

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.

**Section 14: Transportation Information**

Regulatory Body 條例主題	Special Provisions 特定條例
ADR	295 – 304, 598
IMO	UN 3496 SP117 and SP963
UN	UN 3496
US DOT	49 CFR 172, 102 Provision 130
IATA	A199

Form of Transportation	UN No.	UN Proper Shipping Name UN	Transport Hazard Class	Packing Group Number	Environmental Hazards	Guidance Transport in bulk	Special Precaution
Sea	3496	BATTERIES, NICKEL-METAL HYDRIDE	9	-	No	According to ANNEX II of MARPOL 73/78 and the IBC Code	SP117 & SP963

a) In general, all batteries in all forms of transportation (ground, air, or ocean) must be packaged in a safe and responsible manner. Regulatory concerns from all agencies for safe packaging require that batteries be packaged in a manner that prevents short circuits and be contained in “strong outer packaging” that prevents spillage of contents. All original packaging for nickel metal hydride batteries has been designed to be compliant with these regulatory concerns.

Nickel metal hydride batteries (sometimes referred to as “Dry cell” batteries) are not defined as dangerous goods under the IATA Dangerous Goods Regulations 60<sup>th</sup> edition 2019, ICAO Technical Instructions and the U.S. hazardous materials regulations (49 CFR). These batteries are not subject to the dangerous goods regulations as they are compliant with the requirements contained in the following special provisions.

In addition, the IATA Dangerous Goods Regulations and ICAO Technical Instructions require the words "not restricted" and the Special Provision number A199 be provided on the air waybill, when an air waybill is issued.

b) International Maritime Organization (IMO) IMDG Code regulated these products as UN 3496 BATTERIES, NICKEL METAL HYDRIDE, class 9 dangerous goods with Special Provision 117 and 963 assigned

**SP117**

Only regulated when transported by sea.

**SP963**

Nickel-metal hydride button cells or nickel-metal hydride cells or batteries packed with or contained in equipment are not subject to the provisions of this Code.

All other nickel-metal hydride cells or batteries shall be securely packed and protected from short circuit. They are not subject to other provisions of this Code provided that they are loaded in a cargo transport unit in a total quantity of less than 100 Kg gross mass. When loaded in a cargo transport unit in a total quantity of 100 Kg gross mass or more, they are not subject to other provisions of this Code except those of 5.4.1, 5.4.3 and column (16) of the dangerous good list in Chapter 3.2.

The requirements of these sections are:

- (1) Dangerous goods transport documentation to accompany the shipment,
- (2) The shipment must be described as "UN3496, BATTERIES, NICKEL-METAL HYDRIDE, CLASS 9" on the shipper's declaration for dangerous goods.
- (3) The dangerous goods description must also be entered on the Dangerous Cargo Manifest and/or the detailed stowage plan in compliance with the IMDG Code requirements for shipboard documentation.

**Section 15: Regulatory Information**

Special requirement be according to the local regulatory.

**Section 16: Other Information**

The data in this Material Safety Data Sheet relates only to the specific material designated herein.

**Section 17: Measures for fire extinction**

In case of fire, it is permissible to use any class of extinguishing medium on these batteries or their packing material. Cool exterior of batteries if exposed to fire to prevent rupture. Fire fighters should wear self-contained breathing apparatus.