

Safety Data Sheet for Chemical Products (SDS)

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Lithium Ion Battery
 Product code: Models assembled with individual cell capacities of less than or equal to 5.4Ah.
 Company name: National Power
 Corporation Address: 4330 W. Belmont Ave., Chicago IL 60641, USA
 Telephone number: 1-773-685-2662
 Fax number: 1-773-685-8316
 Emergency: 1-800-424-9300 North America
 telephone number 001-703-527-3887 International

2. COMPOSITION / INFORMATION ON INGREDIENTS

Substance or preparation: Preparation
 Information about the chemical nature of product: *1

Portion	Material Name	Concentration range (wt %)
Cell positive electrode	Lithium transition metal oxidate (Li[M] _m [O] _n *2)	20 ~ 60
Positive electrode's base	Aluminum	1 ~ 10
Cell negative electrode	Carbon	10 ~ 30
Negative electrode's base and printed circuit board (PCB)	Copper	1 ~ 15
Cell electrolyte	Organic electrolyte principally involves ester carbonate	5 ~ 25
Cell outer case	Aluminum, iron, aluminum laminated plastic	1 ~ 30
Cell interconnect	Nickel	1 ~ 2
Solder	Tin, silver	< 1
PCB	Epoxy Resin, woven fiberglass	2 ~ 3
Battery outer case	Polycarbonate, Acrylonitrile/Butadiene/Styrene (ABS) or Poly Vinyl Chloride (PVC)	2 ~ 5
Battery label	Polycarbonate or Polyester and acrylate Copolymer Adhesive	< 1

*1 Not every product includes all of these materials.

*2 The letter M means transition metal and candidates of M are Co, Mn and Ni. One compound includes one or more of these metals and one product includes one or more of the compounds. The letter m and n mean the number of atoms.

• Specific hazards: If the electrolyte contacts water, it will generate hydrogen fluoride. Since leaked electrolyte is flammable liquid, keep away from fire.

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, explosion or chemical danger of hazardous materials leakage. However, if exposed to a fire, added mechanical shocks, decomposed and/or added electric stress by misuse, the gas release vent will operate. At the extreme, the battery cell case will be breached and hazardous materials may be released. Moreover, if heated significantly by the surrounding fire, acrid gas may be released.

- Most important hazard and effects

Human health effects: Inhalation: The steam of the electrolyte has an anesthesia-like action and stimulates the respiratory tract. Skin contact: The steam of the electrolyte stimulates the skin. The electrolyte-skin contact causes a sore and stimulation on the skin. Eye contact: The steam of the electrolyte stimulates eyes. The electrolyte-eye contact causes a sore and stimulation of the eye. Especially, a substance that causes a strong inflammation of the eyes is present.

Environmental effects: Since a battery cell remains in the environment, it must be disposed of properly.

If the electrolyte contacts water, it will generate hydrogen fluoride.

Since electrolyte is flammable liquid, do not expose to fire.

4. FIRST-AID MEASURES

Spilled internal cell materials

- Inhalation:

Make the victim blow his/her nose and gargle. Seek medical attention if necessary.

- Skin contact:

Remove contaminated clothes and shoes immediately. Wash contact region with soap and plenty of water immediately.

- Eye contact:

Do not rub one's eyes. Immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention immediately.

A battery cell and spilled internal cell materials

- Ingestion:

Induce vomiting then seek medical attention.

5. FIRE-FIGHTING MEASURE

Suitable extinguishing media: Water, carbon dioxide gas, nitrogen gas, dry chemical 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, choose the fire extinguishing method which corresponds to the other combustibles.

Protective equipment for firefighters: Respiratory protection: Respiratory equipment of a gas cylinder style or dusk mask. Hand protection: Protective gloves. Eye protection: Goggle or protective glasses designed to protect against liquid splashes. Skin and body protection: Protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Spilled internal cell materials, such as electrolyte leaked from a battery cell, should be handled according to the following instructions.

- Precautions for human body: Remove spilled materials with protective equipment (protective glasses and protective gloves). To the extent possible, do not inhale the gas and avoid touching the spilled material.
- Environmental precautions: Dispose of according to appropriate local and national regulations.
- Method of clean up: Spilled solids are put into a container. The any residue is wiped up with a dry cloth.
- Prevention of secondary hazards: Avoid scattering. Avoid exposure to fire or heat.

7. HANDLING AND STORAGE

- Handling suggestions:

Never dispose in fire or expose to high temperatures. Do not soak in water. Do not expose to strong oxidizers. Do not expose to severe mechanical shock. Do not disassemble, modify or deform. Do not connect the positive terminal to the negative terminal with electrically conductive material. Do not use in a place where temperature can be high. Do not use unauthorized charger or charging method. Terminate charge if the charging process does not complete within specified time.

- Storage

Avoid direct sunlight, high temperature and high humidity. Do not store the battery with conductive materials, water, seawater, strong oxidizers and strong acids. Store at 30~50% state of charge. Store in cool, dry area (temperature: -20 ~ 35 degree C, humidity: 45 ~ 85%). Use non-conductive and adequately strong packaging material to prevent short circuit.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION (if electrolyte leaks)

- Control parameters
ACGIH has not addressed the control parameter of electrolyte.
- 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: Work clothes with long sleeves and long trousers.

9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance
Physical state: Solid. Form: Cylindrical or Prismatic Color: Black, white or gray enclosure. Odor: No odor.

10. STABILITY AND REACTIVITY

- Stability: Stable under normal use
- Hazardous reactions occurring under specific conditions
Conditions to avoid:
Crushing Short-circuit
Deformation
Temperature above 100c
Direct sunlight 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.

11. TOXICOLOGICAL INFORMATION

Organic Electrolyte

- Acute toxicity: LD₅₀, oral - Rat 2,000mg or more
- Irritating nature: Irritant to skin and eyes

12. ECOLOGICAL INFORMATION

- Persistence/degradability: Dispose of properly, according to regional

and national regulations.

13. DISPOSAL CONSIDERATIONS

- Recommended methods for safe and environmentally preferred disposal:

Product (waste from residues) Specified collection or disposal of lithium ion batteries is required by the law in several nations. Collection or recycling of the battery is mainly imposed on the battery manufacturer or importer where laws govern battery recycling.

Contaminated packaging Neither a container nor packing is contaminated during normal use. When internal materials leaked from a battery contaminate the packaging, dispose of as industrial wastes subject to hazardous material control.

14. TRANSPORT INFORMATION

Avoid exposure to high temperatures and prevent the formation of condensation. Handle properly avoiding dropping and possible damage. Avoid exposure to rain. The container must be handled carefully. Avoid shock that may result in damage to the battery/cell. Refer to Section 7-HANDLING AND STORAGE also.

UN regulation

- ID number: 3480
- Proper shipping name:
Lithium ion batteries
- Class: 9 *
- Packing group: II *

** However this product is defined as above, it is **not** recognized as "DANGEROUS GOODS" when its transport condition accords with instructions or provisions depending on region and transportation mode. Please see descriptions in box brackets of following regulations.*

Regulation depends on region, transportation mode, quantity and weight.

- Worldwide, cargo air transportation:
 - Lithium Ion Batteries only (UN3480): IATA-DGR [packing instruction 965]
 - Lithium Ion Batteries packed with equipment (UN3481): IATA-DGR [packing instruction 966]
 - Lithium Ion Batteries contained in equipment (UN3481): IATA-DGR [packing instruction 967]
- Worldwide, sea transportation:
 - IMO-IMDG Code [special provision 188]
- USA, ground and air transportation:
 - US DOT 49 CFR 172.102.188 [special provision 188]
- Europe, ground transportation:
 - ADR [special provision 188]

15. REGULATORY INFORMATION

Regulations specifically applicable to the product: US Department of Transportation 49 Code of Federal Regulations [USA] Waste Disposal and Public Cleaning Law [Japan] Law for Promotion of Effective Utilization of Resources [Japan]

** About overlapping regulations, please refer to Section 14-TRANSPORT INFORMATION.*

16. OTHER INFORMATION

This safety data sheet is offered to provide for safe handling of these products. Use this safety data sheet effectively. Post it, train involved personnel and take other appropriate measures.

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 a guarantee of technical performance or suitability for particular applications.

Reference Chemical substances information: Japan Advanced Information center of Safety and Health
International Chemical Safety Cards (ICSCs): International Occupational Safety and Health Information Centre (IOSH) Dangerous Goods Regulations – 55th Edition Effective 1 January 2014: International Air Transport Association (IATA) IMDG Code - 2012 Edition: International Maritime Organization (IMO) The European Agreement concerning the International Carriage of Dangerous Goods by Road – 2013: The United Nations Economic Commission for Europe (UNECE) MSDS of raw materials prepared by the manufacturers