



LiFePO4 BATTERY SAFETY DATA SHEET

Section 1: PRODUCT AND COMPANY IDENTIFICATION

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PRODUCT NAME: Lithium-Iron-Phosphate

REVISION NUMBER: 1.2 Volume-3

SDS NUMBER: LION-1

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Section 2: HAZARDS IDENTIFICATION

NOTE: Under normal conditions of battery use, internal components will **not** present a health hazard. The following information is provided for battery electrolyte (acid) for exposure that may occur during container breakage or under extreme heat conditions such as fire.

EMERGENCY OVERVIEW:

The battery should not be opened or burned. Exposure to the ingredients contained within or their combustion products could be harmful. If the battery is opened or broken then the following hazards apply:



ROUTES OF ENTRY:

EYE CONTACT: Contact with the battery electrolyte can cause severe irritation, burns, and cornea damage upon contact.

SKIN CONTACT: Battery electrolyte (acid) can cause severe irritation, burns and ulceration.

SKIN ABSORPTION: Not a significant route of entry

INHALATION: Acid mist generated during battery charging or spillage of the electrolyte in a confined area may cause respiratory irritation.

INGESTION: The electrolyte ingestion irritates the mouth and the throat seriously resulting in serious burns to the mouth and gastrointestinal tract.

ACUTE HEALTH EFFECTS: Exposure and/or contact with battery electrolyte (acid) may lead to acute irritation of the skin, corneal damage of the eyes, and irritation of the mucous membranes of the eyes and upper respiratory system, including lung.

CHRONIC HEALTH EFFECTS: Chronic overexposure to nickel may result in cancer; dermal contact may result in dermatitis in sensitive individuals.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: 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.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Material	% by Wt.	CAS Number	Molecular Formula
Lithium Iron Phosphate	28.4%	12190-79-3	LiCoO ₂
Graphite	17.1%	7782-42-5	C
Lithium Hexafluorophosphate	1.3%	21324-40-3	LiPF ₆
Ethylene carbonate	3.4%	96-49-1	C ₃ H ₄ O ₃
Diethyl carbonate	4.7%	105-58-8	C ₅ H ₁₀ O ₃
Dimethyl carbonate	3.8%	616-38-6	C ₃ H ₆ O ₃
Polypropylene	2%	9003-07-0	(C ₃ H ₆) _n
Steel	31.1%	7439-89-6	Fe
Copper	5.7	7440-50-8	Cu
Aluminum	2.5%	7429-90-5	Al

Section 4: FIRST AID MEASURES

EYE CONTACT: Immediately rinse with cool running water for at least 15 minutes. Seek medical attention immediately after rinsing.

SKIN CONTACT: Wash thoroughly with soap and water. If acid is splashed on clothing or shoes, remove immediately and discard. Acid cannot be removed from leather.

INHALATION: Remove from exposure to fresh air and consult a physician if any of the acute effects listed above develop.

INGESTION: Lead: Consult a physician. Battery Electrolyte: Do not induce vomiting. Refer to a physician immediately.

Section 5: FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Dry chemical, foam, or CO₂

SPECIAL FIRE FIGHTING PROCEDURES: Use positive pressure, self-contained breathing apparatus and full protective clothing.

SPECIFIC HAZARDS: Batteries may burst and release hazardous decomposition products when exposed to a fire situation.

Section 6: ACCIDENTAL RELEASE MEASURES

Remove combustible materials and all sources of ignition. Contain spill by diking with soda ash (sodium carbonate) or quicklime (calcium oxide). Cover spill with either chemical. Mix well. Make certain the mixture is neutral, and then collect residue and place in a drum or other suitable container. Dispose of as a hazardous waste. Wear acid-resistant boots, chemical face shield, chemical splash goggles, and acid-resistant gloves.

Section 7: HANDLING AND STORAGE

WORK PRACTICES: 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.

SPECIAL PRECAUTIONS: Do not damage or remove the external tube. Batteries may rupture or vent if disassembled, crushed, or exposed to high temperatures.

STORAGE: Store NiMH batteries in a dry place at normal room temperature. Avoid direct sunlight, high temperature and high humidity. Avoid contact with conductive materials, water, seawater, strong oxidizers and strong acids.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

VENTILATION: Not required under normal handling conditions. Battery should not be opened. Should a cell become disassembled, the electrode should be stored in a fireproof cabinet, away from combustibles.

RESPIRATORY PROTECTION: None required under normal handling conditions. If respiratory irritation occurs, wear a respirator suitable for protection against acid mist.

GLOVES: None required under normal handling conditions. Use neoprene or natural rubber gloves if handling an open or leaking battery.

EYE PROTECTION: None required under normal handling conditions. Wear safety glasses with side shields if handling an open or leaking battery.

OTHER PROTECTIVE EQUIPMENT: None required under normal handling conditions.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

❖ APPEARANCE (PHYSICAL STATE, & COLOR) :	Solid,Cylindrical,Metallic
❖ ODOR:	Odorless
❖ ODOR THRESHOLD:	Not applicable
❖ PH:	Not applicable
❖ MELTING POINT/FREEZING POINT:	Not applicable
❖ INITIAL BOILING POINT AND BOILING RANGE:	Not applicable
❖ FLASH POINT:	Not applicable
❖ EVAPORATION RATE:	Not applicable
❖ FLAMMABILITY (SOLID, GAS):	Not determined
❖ UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS:	Not determined
❖ VAPOR PRESSURE:	Not applicable
❖ VAPOR DENSITY:	Not applicable
❖ RELATIVE DENSITY:	Not applicable
❖ SOLUBILITY(IES):	Not applicable
❖ PARTITION COEFFICIENT: N-OCTANOL/WATER:	Not applicable
❖ AUTO-IGNITION TEMPERATURE:	Not applicable
❖ DECOMPOSITION TEMPERATURE:	Not applicable

Section 10: STABILITY AND REACTIVITY

STABILITY: Unstable Stable

CONDITIONS TO AVOID: Flames, sparks, and other sources of ignition

INCOMPATIBILITY: Conductive materials, water, seawater, strong oxidizers and strong acids

HAZARDOUS DECOMPOSITION PRODUCTS: Acid or harmful fumes are emitted during fire.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Flames, sparks, and other sources of ignition, incompatible materials. Also avoid direct sunlight and high humidity

Section 11: TOXICOLOGICAL INFORMATION

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

Acute toxicity:

Copper: 60-100mg sized coarse particulate causes a gastrointestinal disturbance with nausea and inflammation. TDLo, hypodermic - Rabbit 375mg/kg

Organic electrolyte: LD50, oral - Rat 2,000mg/kg or more

Further toxicological information:

Aluminum: By the long-term inhalation of coarse particulate or fume, it is possible to cause lung damage (aluminum lungs).

Graphite: Long-term inhalation of high levels of graphite coarse particulate may cause lung disease or a tracheal disease.

Section 12: ECOLOGICAL INFORMATION

EFFECTS OF MATERIALS ON PLANTS OR ANIMALS: Nickel and its compounds may cause an adverse effect to animals and plants that come into contact with them.

EFFECTS ON AQUATIC LIFE: Nickel and its compounds may cause an adverse effect to animals and plants in an aquatic environment that come into contact with them.

Section 13: DISPOSAL

Intact, spent batteries are not considered to be hazardous waste.

Waste Lithium Ion batteries meet the United States federal definition of a solid waste per 40 Code of Federal Regulations (CFR) 261.2. It is recommended that the batteries be recycled even though they can be disposed of in the garbage. To find an Interstate All Battery Store that will send NiMH batteries for recycling, please go to the dealer locator. Recycling: Waste NiMH batteries do not fall under any specific RCRA, F, K, P or U lists. Other nations and some US states may regulate waste based on additional criteria or different test protocols. The status of scrap NiMH batteries should be confirmed in the nation or US state where disposal occurs.



Section 14: TRANSPORTATION INFORMATION

UN NUMBER: UN3480/3481

UN PROPER SHIPPING NAME: Lithium-Ion-Battery Batteries **TRANSPORT**

HAZARD CLASS: Class 9 HAZMAT

International transport regulations:

1. International Air Transport Association (IATA) pursuant to Packing Instruction 965-967, Section II
2. International Maritime Dangerous Goods Code (IMDG) pursuant to Special Provisions A188 and A230.
3. U.S. hazardous materials regulations pursuant to 49 CFR 173.185 and Special Provision A188.

IATA Packaging Instruction Packing Instruction 965-967 Section II

Our Li-ion cells pass the tests defined in UN model regulation section 38.3. Cells and batteries are packed according to the requirement of 56th Edition of the IATA Dangerous Goods Regulations (DGR).

Section 15: REGULATORY INFORMATION

The transport of rechargeable Lithium-Ion batteries regulated by the United Nations as detailed in the "model Regulations on the transport of dangerous Goods Ref. ST/SG/AC.10/1 Revision 23 2021".

Defined by UN in the "Recommendations on the transport of Dangerous Goods Chapter 38.3 Manual of Tests and Criteria Ref. ST/SG/AC.10/11 Fifth revised edition 2011". The Lithium-Ion Cells and the battery packs may or may not be assigned to the UN3480 Class 9 that is restricted for transport.

Section 16: OTHER INFORMATION

Disclaimer: This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty (either express or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein. This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his own particular use. We do not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from use of this information.