Material Safety Data Sheet

For

Bioenno Power Lithium Iron Phosphate (LiFePO4) Battery
(A Type of Lithium Ion Battery)

Product Name: Bioenno Power Lithium Iron Phosphate (LiFePO4) Battery (A Type of Lithium Ion Battery)

Section 1 – Chemical Product and Company Identification

Manufacturer/Supplier Name: Bioenno Tech LLC / Bioenno Power®

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Section 2 – Hazards Identification

Preparation hazards and classification	Not dangerous with normal use. Do not dismantle, open, or shred Li-ion Battery. Exposure to the ingredients contained within or their ingredient's products could be harmful.
Appearance, color, and odor	Solid object with no odor, no color
Primary route(s) of exposure	These chemicals are contained in a sealed stainless steel enclosure. Risk of exposure occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, exposure to the electrolyte solution contained within can occur by inhalation, ingestion, eye contact and skin contact.
Potential health effects	ACUTE (short term): see Section 8 for exposure controls in the event that this battery has been ruptured. The electrolyte solution contained within the battery would be corrosive and can cause burn. Inhalation: inhalation of materials from a sealed battery is not an expected route of exposure. Vapors or mists from a ruptured battery may cause respiratory irritation. Ingestion: swallowing of materials from a sealed battery is not an expected route of exposure. Swallowing the contents of an open battery can cause serious chemical burns of mouth, esophagus, and gastrointestinal tract. Skin: Contact between the battery and skin will not cause any harm. Skin contact with contents of an open battery can cause severe irritation or burns to the skin.

	Eye: Contact between the battery and the eye will not cause any harm. Eye contact with contents of an open battery can cause severe irritation or burns to the eye. CHRONIC (long term): see Section 11 for additional toxicological data.
Medical conditions aggravated by exposure	Not applicable
Reported as carcinogen	No applicable

Section 3 – Composition/Information on Ingredients

Li-ion Battery is a mixture

Hazardous Ingredients (Chemical Name)	Concentration of concentration ranges (%)	CAS Number
Aluminum foil (Al)	14.30%	7429-90-5
Copper foil (Cu)	9.38%	7440-50-8
SBR (C8H8C4H6)n	0.61%	61789-96-6
Lithium Iron Phosphate (LiFePO4)	31.92%	15365-14-7
Graphite powder (C)	14.6%	7782-42-5
Rubber	8.36%	69028-37-1
Carbon Black	0.9%	1333-86-4
Polypropylene	1.84	9003-07-0
Polyethylene	1.37	9002-88-4
Lithium hexafluorophosphate ($LiPF_6$)	1.31	21324-40-3
Ethylene carbonate (EC)	4.26%	96-49-1
Diethyl carbonate (DEC)	9.23%	105-58-8
Propylene carbonate (PC)	0.81	108-32-7
Nickel	1.11	7440-02-0

Labeling according to EC directives.

No symbol and risk phrase are required.

Note: CAS number is Chemical Abstract Service Registry Number.

N/A=Not apply.

Section 4 – First-aid Measures

Inhalation	If contents of an opened battery are inhaled, remove source of contamination or move victim to fresh air. Obtain medical advice.
Skin contact	If skin contacts the contents of an open battery, remove contaminated clothing, shoes and leather goods as quickly as possible. Immediately flush with lukewarm, gently flowing water for at least 30 minutes. If irritation or pain persists, seek medical attention. Completely decontaminate clothing, shoes and leather goods before reuse or discard.
Eye contact	If the eye(s) contact the contests of an open battery, immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes while holding the eyelids open. Neutral saline solution may be used as soon as it is available. If necessary, continue flushing during transport to emergency care facility. Take care not to trines contaminated water into the unaffected eye or onto face. Quickly transport victim to an emergency care facility.
Ingestion	If ingestion of the contents of an open battery occurs, never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 60-240 mL (2-8 oz) of water. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Have victim rinse mouth with water again. Quickly transport victim to an emergency care facility.

Section 5 – Fire-fighting Measures

Flammable properties	In the event that the battery has been ruptured, the electrolyte solution contained within the battery would be flammable. Like any sealed container, battery cells may rupture when exposed to excessive heat; this could result in the release of flammable or corrosive materials.
Suitable extinguishing media	Use extinguishing media suitable for the materials that are burning
Unsuitable extinguishing media	Not available
Explosion data	Sensitivity to mechanical impact: This may result in rupture in extreme cases. Sensitivity to static discharge: Not applicable
Specific hazards arising from the chemical	Fires involving Li-ion Battery can be controlled with water. When water is used, however, hydrogen gas may evolve. In a confined space, hydrogen gas can form an explosive mixture. In this situation, smothering agents are recommended to extinguish the fire.
Protective equipment and precautions	As for any fire, evacuate the area and fight the fire from a safe distance. Wear a pressure-demand, self-contained breathing apparatus and full protective gear. Fight fire from a protected location or a safe distance. Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

for firefighters	
NFPA	Health: 0 Flammability: 0 Instability: 0

Section 6 – Accidental Release Measures

Personal precautions, protective equipment, and emergency procedures	Restrict access to area until completion of clean-up. Do not touch the spilled material. Wear adequate personal protective equipment as indicated in Section 8.
Environmental precautions	Prevent materials from contaminating soil and from entering sewers or waterways.
Methods and materials for containment	Stop the leak if safe to do so. Contain the spilled liquid with dry sand or earth. Clean up spills immediately
Methods and materials for clean up	Absorb spilled material with an inert absorbent (dry sand or earth). Scoop contaminated absorbent into an acceptable waste container. Collect all contaminated absorbent and dispose of according to directions in Section 13. Scrub the area with detergent and water; collect all contaminated wash water for proper disposal

Section 7 – Handling and Storage

Handling	Don't handle Li-ion Battery with metalwork. Do not open, disassemble, crush, or burn battery. Ensure good ventilation/exhaustion at the workplace. Prevent formation of dust. Information about protection against explosions and fires: Keep ignition sources away Do not smoke.
Storage	If the Li-ion Battery is subject to storage for more than 3 month, it is recommended to recharge the Li-ion Battery periodically. 3 months: -10C ~40C, 45to 85% RH Recommended storage temperature: 0C ~ 35C The capacity recovery rate in the delivery state (50% capacity of fully discharged) after storage is assumed to be 80% or more. The voltage for a long time storage shall be 3.7V ~ 4.2V range

	Do not store Li-ion Battery haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects. Keep out of reach of children Do no expose Li-ion Battery to heat or fire. Avoid storage in direct sunlight. Do not store together with oxidizing and acidic materials

Section 8 – Exposure Controls and Personal Protection

Engineering controls	Use local exhaust ventilation or other engineering controls to control sources of dust, mist, fumes, and vapor. Keep away from heat and open flame. Store in a cool, dry place.
Personal protective equipment	Respiratory protection: Not necessary under normal conditions. Skin and body protection: Not necessary under normal conditions. Wear neoprene or nitrile rubber gloves if handling an open or leaking battery. Hand protection: Wear neoprene or natural rubber material gloves if handling an open or leaking battery. Eye protection: Not necessary under normal conditions. Wear safety glasses if handling an open or leaking battery.
Other protective equipment	Have a safety shower and eye wash station readily available in the immediate work area.
Hygiene measures	Do not eat, drink, or smoke in work area. Maintain good housekeeping.

Section 9 – Physical and Chemical Properties

Physical State	Form: Solid	
	Color: Black	
	Odor: Monotony	
Change in condition:		
pH, with indication of the concentration		Not applicable
Melting point/freezing point		Not available
Boiling point, initial boiling point and boiling		Not available

Range:	
Flash point	Not available
Upper/lower flammability or explosive limits	Not available
Vapor pressure	Not applicable
Vapor density: (Air=1)	Not applicable
Density/relative density	Not available
Solubility in water	Insoluble
n-octanol/water partition coefficient	Not available
Auto-ignition temperature	130C
Decomposition temperature	Not available
Odout threshold	Not available
Evaporation rate	Not available
Flammability (soil, gas)	Not available
Viscosity	Not applicable

Section 10 – Stability and Reactivity

Stability	The product is stable under normal conditions
Conditions to avoid (e.g. static discharge, shock or vibration)	Do not subject Li-ion Battery to mechanical shock Vibration encountered during transportation does not cause leakage, fire or explosion. Do not disassemble, crush, short or install with incorrect polarity. Avoid mechanical or electrical abuse.
Incompatible materials	Not available
Hazardous decomposition products	This material may release toxic fumes if burned or exposed to fire
Possibility of hazardous reaction	Not available

Section 11 – Toxicological Information

Irritation	Risk of irritation occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, irritation to the skin, eyes and respiratory tract may occur.
Sensitization	Not available
Neurological effects	Not available
Teratoaenicity	Not available
Reproductive toxicity	Not available
Mutagenicity (genetic effects)	Not available

Toxicologically synergistic materials	Not available

Section 12 – Ecological Information

General note	Water hazard class 1(self-assessment): slightly hazardous for water. Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage systems
Anticipated behavior of a chemical product in environment/possible environmental impact/ecotoxicity	Not available
Mobility in soil	Not available
Persistence and degradability	Not available
Bioaccumulation potential	Not available
Other adverse effects	Not available

Section 13 – Disposal Considerations

Product disposal recommendation: Observe local, state, and federal laws and regulations.

Packaging disposal recommendation: Be aware discarded batteries may cause fire, tape the battery terminals to insulate them. Don't disassemble the battery. Completely discharge containers (no tear drops, no powder rest, scraped carefully). Containers may be recycled or reused. Observe local, state, and federal laws and regulations.

Section 14 – Transport Information

For Ground/Surface Shipping, all LiFePO4 batteries are non-restricted and shipped as regular cargo.

For Air Shipping, for all LiFePo4 batteries *less* than 100 Watt-hours, these LiFePO4 batteries are non-restricted and shipped as regular cargo.

For Air Shipping, for all LiFePO4 batteries *greater* than 100 Watt-hours, the batteries are to be shipped as Class 9, UN3480. For Air Shipping, for all LiFePO4 batteries greater than 100 Watt-hours and packed with equipment the batteries are to be shipped as Class 9, UN3481.

Section 15 – Regulatory Information

Law Information

《Dangerous Goods Regulation》

《Recommendations on the Transport of Dangerous Goods Model Regulations》

《International Maritime Dangerous Goods》

《Classification and code of dangerous goods》

OSHA Hazard Communication Standard Status

Toxic Substances Control Act (TSCA) Status

SARA Title III

RCRA

In accordance with all Federal, State and Local laws.

Section 16 –Other Information

The information above is believed to be accurate and represents the best information currently available to us. However, Bioenno Tech LLC / Bioenno Power makes no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. This Material Safety Data Sheet provides guidelines for the safe handling and use of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required.

The data/information contained herein has been reviewed and approved for general release on the basis that this document contains no export controlled information.

********** END OF MSDS**********