

Safety Data Sheet OPTIMA ORANGETOP LITHIUM BATTERY

1. IDENTIFICATION

Data on the product: **Low voltage Li-lon battery** Rechargeable Lithium-lon battery pack

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2. HAZARD(S) IDENTIFICATION

No hazards expected in case of an intact battery while observing the use instructions.

Lithium-Ion batteries contain organic electrolyte liquid. In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Exposure and/or contact with organic electrolyte solution/mist 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 lungs.

For this reason, the following hazard symbols must be taken into account 1)



Mandatory action sign M002: Refer to instruction manual/booklet



Prohibition sign P003: No Fire, No Smoking



Mandatory action sign M004: Use protective eyewear



Prohibition sign P036: No children allowed / Keep out of reach of children



Warning sign W023: Corrosive substances



Warning sign W021: Combustible and flammable materials

Note: Do not clean batteries with dry cloth, use damp cloth, due to electrostatic charge

¹⁾ The hazard symbols correspond to ISO 7010. A marking of batteries according GHS CLP-regulation is not required.



2.1 GHS hazard statements Electrolyte - Mixed Organic solvents and electrolyte salt

H226 - Flammable liquid and vapor

H290 - May be corrosive to metals

H302 - Harmful if swallowed

H311 - Toxic in contact with skin

H312 - Harmful in contact with skin

H314 - Causes severe skin burns and eye damage

H315 - Causes skin irritation

H319 - Causes serious eye irritation

H332 - Harmful if inhaled

2.2 GHS hazard statements

Electrodes – Mixed metals and Lithium Iron Phosphate:

H251 - Self-heating: may catch fire

H302 - Harmful if swallowed

H315 - Causes skin irritation

H317 – May cause allergic skin reaction

H319 – Causes serious eye irritation

H335 – May cause respiratory irritations

H350i - May cause cancer by inhalation

H372 - Causes damage to organs through prolonged or repeated exposure

H412 - Harmful to aquatic life with long lasting effects

H413 - May cause long lasting harmful effects to aquatic life

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Battery Weight % ¹	Classification 1272/2008 (CLP) GHS hazard statements
Lithium Iron Phosphate	15365-14-7	20 – 40	H413
Graphite	7782-42-5	10 – 30	H251, H315, H319, H335, H350, H372
Iron	7439-89-6	10 – 20	
Aluminum Metal	7429-90-5	5 – 10	H372, H413
Copper Metal	7440-50-8	5 – 10	H335, H372, H412
Nickel	7440-02-0	1-5	H317, H350
Mixed Organic Solvents	Mixture (623-53-0; 616-38-6 and others)	5 – 15	H226, H302, H312, H315, H319, H332
Lithium Hexafluorophosphate	21324-40-3	1-3	H290, H302, H311, H314
Polyvinylidene fluoride resin	24937-79-9	1-3	
Plastic (var.) ²		10 – 20	

¹Content may vary

² Composition of the plastic may vary



4. FIRST AID MEASURES

The information below is relevant only if the battery is damaged and direct contact to the contained compounds takes place.

According EC 1272/2008 (CLP) the contained compounds are classified as hazardous.

Inhalation EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

However, if organic electrolyte liquid is released due to overcharging or abuse of the battery, remove exposed person to fresh air. If breathing is difficult, oxygen may be administered. In severe cases obtain medical attention immediately.

Skin contact EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

However, if organic electrolyte liquid contacts skin, wash off skin thoroughly with water. Remove contaminated clothing and wash before reuse. If irritation develops or in severe cases obtain medical attention immediately. Seek medical attention as soon as possible for all burns regardless of how minor they may appear initially.

Eye contact EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

However, if organic electrolyte liquid enters eyes, thoroughly flush eyes with water for a minimum of 15 minutes, occasionally lifting the upper and lower eyelids. Obtain medical attention immediately.

Ingestion EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

However, if internal components are ingested, rinse out mouth thoroughly with water and give plenty of water to drink. Do not induce vomiting. Obtain medical attention immediately.

5. FIRE FIGHTING MEASURES

Flash Point	Not applicable unless individual components exposed.
Auto ignition	Not applicable unless individual components exposed.
Temperature	
Flammable Limits in	Not applicable unless individual components exposed.
Air, % by volume	
Extinguishing	Dry chemical, foam, or CO ₂ extinguishers. CO ₂ extinguishers, generous amounts of water
Media	spray, copious quantities of water or water-based foam can be used to cool down burning
	Lithium-Ion cells and batteries.
Special Fire Fighting	Use positive pressure, self-contained breathing apparatus. Wear protective clothing to
Procedures	prevent potential body contact with the electrolyte solution or its by-products.
Unusual Fire and	The sealed battery is not considered flammable, but it will vent and burn if involved in a fire.
Explosion Hazard	The organic electrolyte reacts with moisture/water to produce hydrogen fluoride (HF).
	Decomposition products may include metal oxides/oxides.



6. ACCIDENTAL RELEASE MEASURES

NOTE: Under normal conditions of use, this product does not present a health hazard. The following information is provided for organic electrolyte and the mixed metal oxide exposure that may occur due to container breakage or under extreme conditions such as fire.

Personal Precautions, protective equipment, and emergency procedures	In case of rupture. Attention! Corrosive material. Avoid contact with skin, eyes, and clothing. Use recommended personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Refer to protective measures listed in section 7 and 8.
Environmental Precautions	Prevent product from contaminating soil and from entering sewers or waterways.
Methods and material 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 cleaning up	Cover battery or spilled substances with an absorbing material (dry sand or earth), place in approved sealed container. Collect all contaminated absorbent and dispose of according to direction in section 13. Scrub the area with detergent and water, collect all contaminated wash water for proper disposal.
Waste Disposal Method	Dispose of in accordance with applicable local, state and federal regulations.

7. HANDLING AND STORAGE

Handling

Do not crush, pierce, short circuit (+) and (-) battery terminals with conductive (i.e. metal) goods. Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types and brands. Do not mix new and used batteries. Keep batteries in non-conductive (i.e. plastic) trays. Cells or batteries that have been dropped or experienced mechanical shock should be isolated and monitored for a prolonged period to identify a possible internal short circuit and resulting fire.

Storage

Store in a cool (preferably below 30°C) and ventilated area, away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 70°C may result in battery leakage and rupture. Since short circuit can cause burn, leakage and rupture hazard, keep batteries in original packaging until use and do not expose them to unnecessary or excessive handling.

Recommended storage range: 0 to +25 °C.

Other

Follow OPTIMA ORANGETOP recommendations regarding maximum recommended currents and operating temperature range. Do not overcharge beyond the recommended upper charging voltage limit. Applying pressure or deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

Model	QUAD7	QUAD12	QUAD14	QUAD16	QUAD20	QUAD30
Capacity - Nominal (Ah)	3	4.5	7	8	9	15
Operating/Discharge Temperature Limits	0°F to 140°F (-18°C to 60°C)					
Recommended Charging Temperature	14°F to 122°F (-10°C to 50°C)					
Recommended Storage Temperature	32°F to 77°F (0°C to 25°C)					
Recommended Storage Voltage	14V					
Charging Voltage - Max	14.9V					
Voltage at 100% Charge	14.4V					
Charging Current - Max via POWERLINK™ (A)	3.5A					
Charging Current - Max continuous via terminals (A)	30A	45A	70A	80A	90A	150A



8. EXPOSURE CONTROLS / PERSONAL PROTECTION

No exposure caused by mixed metals, electrolyte containing solvent and electrolyte salt when handling properly. In case of a damaged battery and with direct contact to the contained organic electrolyte the following occupational exposure limits should be considered.

Occupational exposure limits

US OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)				
Ingredient	CAS Number	Туре	Value	Form
Mixed Metal (May include iron, phosphorus, lithium, copper, nickel and/or aluminum oxide compounds)	Mixture	TWA	AI – 5.0 mg/m ³	Dust
Carbon Solids	1333-86-4 7782-42-5	TWA	3.5 mg/m ³ 15 C/m ³ 5 Cg/m ³	Dust Total Graphite Respirable Dust
Lithium Hexafluorophosphate	21324-40-3		2.5 mg/m ³	Dust

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor Plastic housing containing battery cells and electronics components.

Cells: Rectangular pouch, containing mixed metal oxides, carbon solids and organic electrolyte. If leaking, smells of medical ether.

Odor ThresholdNot applicable.pHNot applicable

Boiling Point Not applicable unless individual components exposed.

Melting Point Plastic pack container (PA6-GF) ISO75/2 Heat deflection: 200°C

Specific Gravity Not applicable unless individual components exposed.

(H₂O = 1)

Flash Point Not applicable

Evaporation Rate Not applicable unless individual components exposed.

(Butyl Acetate = 1)

Vapor Pressure Not applicable unless individual components exposed.

(mm Hg @ 20 deg C)

Flammability Plastic pack container (PA6-GF) – UL94 V0

Upper/lower flammability or explosive limits Vapor PressureNot applicable.
Not applicable.

Vapor Density Not applicable unless individual components exposed.

(Air = 1)

Relative Density Not applicable.

SolubilityNot applicable unless individual components exposed.
% Volatile by Weight
Not applicable unless individual components exposed.

Partition coefficient Not applicable

(n-octanol/water)

Auto-ignition temperatureNot applicableDecomposition temperatureNot applicableViscosityNot applicable



10. STABILITY AND REACTIVITY

Stability The sealed battery is considered stable.

Conditions to Avoid Sparks and other sources of ignition; high temperature; over

charging.

Incompatibility (materials to avoid)Not expected under normal conditions of use.

Organic electrolyte (liquid) – reacts with water to produce

hydrogen fluoride.

Hazardous Decomposition ProductsCarbon monoxide, carbon dioxide, phosphorous oxides.

Mixed metal oxide - nickel, cobalt, and manganese oxides can be

released.

Organic electrolyte – reacts with water to produce hydrogen

fluoride (HF).

Hazardous Polymerization Not applicable.

11. TOXICOLOGICAL INFORMATION

NOTE: Under normal conditions of use, this product does not present a health hazard. The following information is provided for organic electrolyte and the mixed metal oxide exposure that may occur due to container breakage or under extreme conditions such as fire.

Organic electrolyte – reacts with moisture/water to produce hydrofluoric acid in trace quantities. Hydrofluoric acid is extremely corrosive and toxic. In severe exposures it acts as a systemic poison and causes severe burns. The reaction may be delayed. Any contact with this material, even minor, requires immediate medical attention.

ROUTES AND METHODS OF ENTRY

Inhalation EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be severely corrosive to the respiratory tract and may cause sore throat, coughing, labored breathing and lung

congestion/inflammation. Overcharging or seepage of electrolyte from broken batteries may

present inhalation exposure in a confined area.

Skin Contact EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive to the skin. Skin contact can cause serious skin burns which may not be immediately apparent or painful. Symptoms may be delayed 8 hours or longer. The fluoride ion readily penetrates the skin causing destruction of

deep tissue layers and even bone.

Skin Absorption EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be absorbed through the skin.

Eye Contact EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive to the eyes and can cause severe irritation, burns, and cornea damage. Symptoms of redness, pain, blurred vision, and

permanent eye damage may occur.

Ingestion EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive and may cause sore throat, abdominal pain, diarrhea, vomiting, severe burns of the digestive tract, and kidney dysfunction. Hands contaminated by contact with internal components of a battery can also cause



ingestion of mixed metal oxides and carbon solids. Hands should be washed thoroughly prior to eating, drinking, or smoking.

SIGNS AND SYMPTONS OF OVEREXPOSURE

Acute Effects EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Exposure and/or contact with organic electrolyte solution/mist 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 lungs.

Chronic Effects EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Contact with the organic electrolyte may lead to skin burns/ulceration, scarring of the cornea, and chronic respiratory conditions. Extreme exposures – intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream.

POTENTIAL TO CAUSE CANCER

Carbon black has been identified by the International Agency for Research on Cancer (IARC) as possible carcinogenic to humans (Group 2B).

California Proposition 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require warning under the statute – carbon black

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Contact with or exposure to the organic electrolyte may aggravate skin diseases such as eczema and contact dermatitis, respiratory disorders such as lung injuries and asthma, and kidney function.

Toxicological Data

Constituents	Species	Test Results	
Carbon Solids (CAS 7782-42-5)			
Acute			
Inhalation			
LC50	Rat	> 2000 mg/m3, 4 hours	
Oral			
LD50	Rat	> 1000 mg/kg	



12. ECOLOGICAL INFORMATION

Mammalian effects None known if used/disposed of correctly.

Eco-toxicity None known if used/disposed of correctly.

Bioaccumulation potentialNone known if used/disposed of correctly.

Environmental fate None known if used/disposed of correctly.

Mobility in Soil None known if used/disposed of correctly.

13. DISPOSAL CONSIDERATIONS (UNITED STATES)

Waste disposal method Recycle and dispose of in accordance with applicable local, state and

federal regulations.

Landfill of spent Lithium-Ion Batteries is not recommended.

Hazardous waste codeThe waste code should be assigned in discussion between the user, the

producer and the waste disposal company.

Contaminated packaging Empty containers should be taken to an approved waste handling site

for recycling or disposal.



14. TRANSPORT INFORMATION

Updated regulations always supersede the information in this document. It is the responsibility of the shipper to execute any transportation of dangerous goods in conformance with the applicable regulations. Appropriate training is required for the shipper.

The information below applies to Lithium-Ion batteries that have successfully passed testing according to Manual of Tests and Criteria Part III, chapter 38.3 and are not defective and/or carried for disposal or recycling.

If transport of prototypes, defective batteries or carriage for disposal or recycling is required, please contact Clarios for further assistance and information.

Land Transport	Land Transport (US DOT 2023)			
	UN N°:	UN 3480		
	Classification	Class 9		
	Proper Shipping Name	Lithium ion batteries		
	Packaging instructions:	Packaging instructions:		
	49 CFR 173.185(c) - Watt-hour rating of	49 CFR 173.185(b) - Watt-hour rating of		
	battery ≤ 300Wh or cell ≤ 60Wh (Wh = Watt-	battery > 300Wh or cell > 60Wh (Wh =		
	hour)	Watt-hour)		
	Label required:	Label required:		
	UN 3480 UN 3480 If battery is ≤ 100Wh or cell is ≤ 20Wh the outer package must be marked – "LITHIUM ION BATTERIES – FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT".			
	If battery is > 100Wh or cell is > 20Wh the outer package must be marked – "LITHIUM BATTERIES – FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL"			



Sea Transport Sea Transport (IMDG Code 2023) UN N°: UN 3480 Classification: Class 9 Proper Shipping Name: Lithium-ion batteries P903 Packaging instructions: Batteries shall be packed in packagings so that the batteries are protected against damage that may be caused by the movement or placement of the batteries within the packaging. Batteries shall be protected against short circuit. Label required: OR if using special provision 188 the below label See special provision 188, 230, 348, 384, 387 F-A, S-I EmS: Air Transport (IATA-DGR 2023) Air Transport UN N°: UN 3480 Classification: Class 9 **Proper Shipping Name** Lithium ion batteries Packaging instructions: **Packaging instructions:** PI965, Section IB - Watt-hour rating of PI965, Section IA - Watt-hour rating of battery \leq 100Wh or cell \leq 20Wh battery > 100Wh or cell > 20Wh (Wh = Watt-hour) (Wh = Watt-hour) Label required: Label required: **Restrictions / Conditions: Restrictions / Conditions:** Max SoC less than 30% Max SoC less than 30% CAO = 10kg (limit net quantity per package) CAO = 35kg (limit net quantity per package) See Special Provisions - A99, A164, A201, See Special Provisions – A99, A164, A201, A213, A331, A334, A802 A213, A331, A334, A802



15. REGULATORY INFORMATION

In accordance with EU Directive 2006/66/EC Battery Directive and national laws, lithium-ion batteries must be marked by a crossed-out refuse bin, together with the return/recycling symbol, clearly marked as Li-Ion.



The manufacturer, respectively the importer of the batteries shall be responsible for labelling batteries with the symbols. In addition, a consumer / user information on the significance of the symbols has to be attached.

16. OTHER INFORMATION

NFPA ratings NFPA Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3=Serious 4 = Severe



HMIS rating Organic electrolyte liquid



Key or legend to abbreviations and acronyms:

- CLP Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures.
- GHS Globally Harmonized System of Classification and Labelling of Chemicals
- HMIS Hazardous Material Identification System
- LC50 Concentration of the substance that causes 50 % mortality of the test population
- LD50 Doses of the substance that causes 50 % mortality of the test population
- NFPA National Fire Protection Association
- OSHA Occupational Safety & Health Administration
- REACH Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals
- TWA Time weighted average



Disclaimer of Liability

The information in this data sheet for safe handling of lithium-ion batteries is provided in good faith based on existing knowledge. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the article are beyond our control and may be beyond our knowledge. For this and other reasons, manufacturer shall not be liable for any incidental, special or consequential damage claims incurred by purchasers, users or others associated with this product, including, but not limited to, property damage, lost profits, revenues, anticipated sales, business opportunities, goodwill, business interruption and any other injury or damage. Any and all such warranties, other than the limited warranty included herein, are hereby expressly disclaimed and excluded.

This data sheet was prepared and is to be used only for this article.

Articles such as batteries are not in the scope of any regulation which requires the publication of a Safety Data Sheet according (EC) No. 1907/2006 (REACH), as amended by Annex I to Commission Regulation (EU) No. 453/2010.

More information is available:

http://www.clarios.com/