

# MATERIAL SAFETY DATASHEET

Jade-Technologie

Technology : Rechargeable Lithium Prismatic  
Chemical System :  $\text{LiMn}_2\text{O}_4$  | Carbonate based electrolyte | Graphite  
Date : 2008-11-05

## 1. IDENTIFICATION OF THE PREPARATION AND COMPANY

### 1.1. IDENTIFICATION OF THE PREPARATION

Product name : Lithium-Polymer cell

Product Designation	Capacity (Ah)	Voltage (V)	Weight (Kg)
LPP22150240	45	3,7	1,35
LPP47152280	60	3,7	2,2
LPP60152280	100	3,7	3,1

### 1.2. USE OF THE PREPARATION

Batteries and battery pack

### 1.3. IDENTIFICATION OF THE COMPANY

Jade-Technologie, 3, rue de Longjumeau, 91300, Massy, France

### 1.4. EMERGENCY TELEPHONE NUMBER

In France : ORIFLA : +33 1 45 42 59 59

In Europe : 112

In USA : CHEMTREC : +1 (800) 424 9300

## 2. COMPOSITION AND INGREDIENTS (typical weight percentage of basic material)

Product name	CAS-No	EC-No	Concentration%	Danger	Risk	Safety	TLV-TWA
Lithium Manganite (spinel) $\text{LiMn}_2\text{O}_4$	12057-17-9	-	30 - 45	Nn	R22, R43	S2, S22, S24, S26, S36, S37, S43, S45	0.2mg/m3 (as manganese)
Graphite powder	7782-42-5	231-955-3	11 - 21	Xi	R36, R37	S26, S37, S39	2mg/m3 (inhalant coarse particles)
Organic electrolyte	-	-	8 - 18	Xi	R21, R36, R37, R38	S2 S24 S26 S36 S37 S45	-
LIPF6	21324-40-3	244-334-7	1 - 4	T	R22, R24, R34	S2 S8 S22 S24 S26 S36 S37 S45	2,5mg/m3 (F, TWA)
Copper foil	7440-50-8	231-159-6	6 - 16	N/A	N/A	N/A	2mg/m3 (Fume, TWA)
Aluminium foil	7429-90-5	231-072-3	2 - 6	N/A	N/A	N/A	2mg/m3 (Soluble salts, TWA)
Steel and inert components	-	-	Balance	N/A	N/A	N/A	-

CAS-No: from Chemical Abstracts Service

EC-No : from European chemical Substances Information System

TLV-TWA: Threshold Limit Value-Time Weighted Average concentration

## 3. HAZARD IDENTIFICATION

- ♦ The rechargeable lithium-polymer batteries described here are hermetically sealed in metal cases, designed to withstand temperatures and pressures encountered.
- ♦ When used according to normal condition of use and as long as their integrity is maintained, the inner active materials and electrolyte can't be exposed to outside.
- ♦ Do not short circuit, pierce, incinerate, crush, immerse in liquid, force discharge or expose to specified maximum temperatures.
- ♦ Risk of exposure in case mechanical, thermal or electrical abuse.

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## 4. FIRST AID MEASURE

In case of leaking or accidentally opened cells:

- ♦ **Inhalation:** Remove from exposure, Make the victim blow his/her nose, gargle. Seek medical attention if necessary.
- ♦ **Skin contact:** Remove contaminated clothes and shoes immediately. Immediately wash extraneous matter or contact region with soap and plenty of water. In severe cases seek for medical attention.
- ♦ **Eye contact:** Do not rub eyes. Immediately flush eyes with water continuously for at least 15 minutes. Obtain medical attention.
- ♦ **Ingestion:** Make the victim vomit, wash out mouth with water. Immediately seek medical attention.

## 5. FIRE FIGHTING MEASURE

- ♦ **Suitable extinguishing media:** Plenty of water, carbon dioxide gas, nitrogen gas, chemical powder fire extinguishing medium 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, take fire extinguishing method which corresponds to the combustibles. Extinguish a fire from the windward as much as possible.
- ♦ **Special protective equipment for firefighters:**
  - **Respiratory protection:** Respiratory equipment of a gas cylinder style or protection-against-dust mask.
  - **Hand protection:** Protective gloves
  - **Eye protection:** Goggle or protective glasses designed to protect against liquid splashes
  - **Skin and body protection:** Protective clothes

## 6. ACCIDENTAL RELEASE MEASURES

- ♦ Before cleanup measures begin, review the entire MSDS with particular attention to Potential Health Effects; and on Recommended Personal Protective Equipment.
- ♦ Prevent further leakage or spillage. Do not allow material to contaminate ground water system to avoid risk for human and environment.
- ♦ Procedure for Release and Spill: Sweep up and place in a suitable labelled container, dispose or waste according to all local Laws and Regulations.

## 7. HANDLING AND STORAGE

## 7.1. HANDLING

- ♦ Do not connect the positive terminal (+) to the negative terminal (-) with electrically conductive material (i.e. metal)
- ♦ 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 oxidising materials.
- ♦ Do not give a strong mechanical shock or throw down. Never crush, pierce, disassemble, modify or deform.

## 7.2. STORAGE

- ♦ Do not place the battery cell near heating equipment, nor expose to direct sunlight for long periods.
- ♦ Elevated temperatures can result in shortened battery cell life and degrade performance. Store in a cool, dry and well ventilated area (temperature:  $-20/+45^\circ\text{C}$ , humidity: 45-75%).
- ♦ It is suitable to store the batteries in a plastic or insulated holder.

## 7.3. USE

- ♦ Prior to use read and follow product specification regarding current, voltage and temperature maximum ratings.
- ♦ Do not mix batteries of different types, brands as well as new and used batteries.

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- ♦ Use only dedicated charger or charge according to the conditions specified in product specification.

## 8. EXPOSURE CONTROLS AND PERSONNAL PROTECTION

### 8.1. EXPOSURE

- ♦ Engineering controls: Investigate engineering techniques to reduce exposures. Use with adequate ventilation and recommended personal protective equipment.

### 8.2. PERSONNAL PROTECTION

- ♦ **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:** Working clothes with long sleeve and long trousers.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

- ♦ Only applicable in case of damaged batteries with inner components dripped or accidentally opened cells.

### 9.1. PHYSICAL PROPERTIES

- **Physical state:** Solid
- **Form:** Geometric solid
- **Color:** Metallic color (without outer PVC cover)
- **Odor:** No odor

### 9.2. CHEMICAL PROPERTIES

- **pH:** Not Applicable
- **Flash point:** Not Applicable
- **Explosion properties:** Not Applicable
- **Density:** Not Applicable
- **Solubility:** Not Soluble

## 10. STABILITY AND REACTIVITY

- ♦ Hazardous reactions may occur under some specific conditions.
- ♦ **Conditions to avoid:** Exposing a battery cell to an external short-circuit, crushes, modification, high temperature above  $100^\circ\text{C}$  will be the cause of heat generation and ignition. Avoid to be exposed to direct sunlight and high humidity,
- ♦ **Materials to avoid:** Conductive materials, water, seawater, alkali solutions, strong oxidising materials and strong acids,
- ♦ **Hazardous decomposition products:** Acrid or harmful gas is emitted during fire.

## 11. TOXICOLOGICAL INFORMATION

- ♦ There is no available data on the product itself. The information of the internal cell materials is as follows.
  - **Lithium Manganite -  $\text{LiMn}_2\text{O}_4$ ,**
    - **Acute toxicity:** No applicable data.
    - **Reference manganese:** LD50, oral - Guinea pig 9000mg/kg
    - **Local effects:** Unknown.
    - **Sensitization:** The nervous system of respiratory organs may be stimulated sensitively.
    - **Chronic toxicity/Long term toxicity:** By the long-term or repetitive inhalation of coarse particulate of Manganese Oxide ( $\text{MnO}_2$ ), lungs and a nervous system may be affected, bronchitis, pneumonia, nerve disease or nerve mental disorder (manganese poisoning) may be caused.

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- **Skin causticity:** Although it is very rare, the rash of the skin and allergic erythema may result.
- **Aluminum – Al,**
  - **Local effects:** Aluminum itself has no toxicity. When it goes into a wound, dermatitis may be caused.
  - **Chronic toxicity/Long term toxicity:** By the long-term inhalation of coarse particulate or fume, it is possible to cause a lung damage (aluminum lungs).
- **Graphite – G,**
  - **Acute toxicity:** Unknown.
  - **Local effects:** When it goes into one's eyes, it stimulates one's eyes; conjunctivitis, thickening of corneal epithelium or edematous inflammation algebra may be caused.
  - **Chronic toxicity/Long term toxicity:** Since the long-term inhalation of high levels of graphite coarse particulate may become a cause of a lung disease or a tracheal disease.
  - **Carcinogenicity:** Graphite is not recognized as a cause of cancer by research organizations and natural toxic substance research organizations of cancer.
- **Copper – Cu,**
  - **Acute toxicity:** 60-100mg sized coarse particulate causes a gastrointestinal disturbance with nausea and inflammation. TDLo, hypodermic - Rabbit 375mg/kg
  - **Local effects:** Coarse particulate stimulates a nose and a tracheal. When it goes into one's eyes, the symptom of the reddening and the pain is caused.
  - **Sensitization:** Sensitization of the skin may be caused by long-term or repetitive contact.
  - **Reproductive effects:** TDLo, oral - Rat 152mg/kg
- **Organic Electrolyte,**
  - **Acute toxicity:** LD50, oral - Rat 2,000mg/kg or more
  - **Local effects:** Unknown.
  - **Skin irritation study:** Rabbit – Mild
  - **Eye irritation study:** Rabbit - Very severe

## 12. ECOLOGICAL INFORMATION

- ♦ Since some internal materials remain in the environment, do not bury or throw out into environment. If use as directed, and if the integrity of the battery casing is maintained, the ingredient are not expected to pose a significant risk to the environment.

12.1. **Eco Toxicity:** No data available

12.2. **Mobility:** No data available

12.3. **Persistence and degradability:** Not readily biodegradable

## 13. DISPOSAL CONSIDERATIONS

- ♦ Waste disposal must be in accordance with the applicable regulations. Disposal of the lithium ion battery cells should be performed by permitted, professional disposal firms knowledgeable in State or Local requirements of hazardous waste treatment and hazardous waste transportation. Incineration should never be performed by battery but users, eventually by trained professional in authorized facility with proper gas and fume treatment.

## 14. TRANSPORTATION/REGULATORY INFORMATION

14.1. REGULATORY

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- ♦ **US DOT**, all products of §1 are not subject to the requirements of the Department of Transportation (DOT) subchapter C, Hazardous Material Regulations since each product of §1 meets the exceptions under 173.185 (b). The products of §1 are exempted from the US DOT regulations as long as they are separated to prevent short circuits and packed in strong packing for conditions normally encountered in transportation.
- ♦ **IATA and IACO**, all products of §1 are regulated as Hazardous Material by the current edition of the International Air Transport Association (IATA, 50<sup>th</sup> edition) and International Civil Aviation Organization (ICAO) an the when transporting more than 24 cells or 12 batteries in a single package. They must be transported according to the requirement in Special Provision A45.
- ♦ **IMO**, all products of §1 are regulated as Hazardous Material by the International Maritime Organization (IMO) when transporting more than 24 batteries or 12 batteries in a single package. These must be transported according to the requirement in Special Provisions 188 and 230.
- ♦ **ADR, RID**, all products of §1 are regulated as Hazardous Material by the Accord européen sur le transport des marchandises Dangereuses par Route (ADR) and the Règlement concernant le transport International ferroviaire des marchandises Dangereuses (RID) when transporting more than 24 batteries or 12 batteries in a single package. These must be transported according to the requirement in Special Provisions 188 and 230.
- ♦ **UN**, we confirmed the below test results based on the UN manual of tests and criteria 38.3. When manufacturing a new battery pack, one must assure that it's tested in accordance to the UN manual of test and criteria 38.3.
  - UN number:
    - **UN3480** for li-ion (including li-polymer) batteries transported bulk
    - **UN3481** for li-ion (including li-polymer) batteries contained in equipment or packed with it.
    - Shipping mark: **LITHIUM-ION BATTERIES**
    - Hazard Classification: products of §1 are assigned to **class 9** Miscellaneous Dangerous Goods and use UN Identification Number Labels.
    - Packing group: II, Packing instruction 965
    - ELC (Equivalent Lithium Content)
      - ELC of a component cell, in grams, is equal to the rated Ah multiplied by 0,3
      - ELC of a battery, in grams, is equal to cell ELC multiplied by the total number of cells contained within the battery

#### 14.2. INDEPENDENT TEST OF LITHIUM CELL UN TRANSPORTATION MODEL REGULATION

No	Test item	Criteria	Result	Remark
T1	Altitude Simulation	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	/
T2	Thermal test	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	
T3	Vibration	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	
T4	Shock	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	
T5	External Short Circuit	External temperature should not exceed 170°C. No disassembly, rupture, and fire within six hours of this test.	Passed	
T6	Impact	External temperature should not exceed 170°C. No disassembly, rupture, and fire within six hours of this test.	Passed	
T7	Overcharge	No disassembly and fire within seven days of this test.	Passed	
T8	Forced discharge	No disassembly and fire within seven days of this test.	Passed	

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## 15. REGULATORY INFORMATION

Symbol	Risk phrases	Safety phrases
T = Toxic Xn = Harmful Xi = Irritant	R21 = Harmful in contact with skin R22 = Harmful if swallowed R24 = Toxic with skin R34 = Causes burns R36 = Irritating eyes R37 = Irritating to respiratory system R38 = Irritating to skin R43 = May cause sensitization by skin contact	S2 = Keep out of reach of children S8 = Keep away from moisture S16 = Keep from source of ignition S22 = Do not breathe dust S24 = Avoid contact with skin S26 = In case of contact with eyes, rinse immediately with plenty of water and seek medical advice S36 = Wear suitable protective wear S37 = Wear suitable gloves S39 = Wear eye / face protection S43 = in case of fire §5 S45 = In case of accident or if you feel unwell, seek medical advice immediately.

## 16. OTHER INFORMATION

- 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 any guarantee of technical performance or suitability for particular applications.

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