

CorDEX

MATERIAL SAFETY DATA SHEET

COBALT LITHIUM ION CELL
(CDX370 battery pack)

Document Reference: Rev. A

TECHNICAL NOTICE

The information contained within is provided as a service to our customers and for their information only.
The information and recommendations set forth herein are made in good faith and are believed to be accurate at the date of preparation.
Following MSDS is based on E-ONE MOLI ENERGY CORP MATERIAL SAFETY DATA SHEET. DEC 22 2011

1. Product and Supplier Identification

Product Name:	Cobalt based Lithium-ion cell
Type:	Sealed rechargeable lithium ion battery
Production code:	EFSPE-82033 EFSPE-82036 EFSPE80057
Production model:	ICP103450CA
Typical capacity:	1960mAH / 7.25Wh
Typical voltage:	3.7 Voltage
Supplier name:	E-ONE MOLI ENERGY CORP
Taiwan Address:	E-ONE MOLI ENERGY CORP. 10F, NO.113 ,Sec.2, Zhongshan N.Rd, Taipei 104, Taiwan R.O.C.
Phone/Fax:	886-2-2567-3500
EMERGENCY CONTACT:	For chemical emergency only (spill, leak, fire, exposure or accident) call E-ONE MOLI ENERGY CORP at: 886-2-2567-3500#853 Steve Hsiao Fax: 886-2-2567-6500, 886-2-2567-6115

2. Hazards Identification

As a solid, these chemicals and metals are contained in a sealed can. For consumer use, exposure to hazardous ingredients is not expected with normal use. Adequate hazard warnings are included on both the package and on the battery.

Do not short circuit, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion. Under normal conditions of use, the electrode materials and liquid electrolyte they contain are not exposed to the outside, provided the battery integrity is maintained and seals remain intact. Risk of exposure only in case of abuse (mechanical, thermal, electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire) may follow, depending upon the circumstance.

Hazard classification: None

3. Ingredients identification information

Component	% (w/w)	Exposure Limits ^{1,2}	LD ₅₀	LC ₅₀
Dimethyl Carbonate (CAS No. 616-38-6)	3 - 6	Not established	13000 mg/kg (rat/oral) 5000 mg/kg (rabbit/dermal)	Not established
Ethylene Carbonate (CAS No. 96-49-1)	2 - 5	Not established	10400 mg/kg (rat/oral) > 3000 mg/kg (rabbit/dermal)	Not established
Lithium Hexafluorophosphate (CAS No 21324-40-3)	1 - 5	Not established	1702 mg/kg (rat/oral)	>20 mg/kg (rat/4 hour)
Propylene Carbonate (CAS No. 108-32-7)	1 - 4	Not established	29100 mg/kg (rat/oral)	>5000 mg/m ³ (rat/4 hour)
Cobalt Lithium Dioxide (CAS No. 12190-79-3)	10 - 45	0.02 mg/m ³	Not established	Not established
Graphite (CAS No. 7782-42-5, 7440-44-0)	5 - 20	2 mg/m ³	Not established	Not established

- Exposure Limits are those published by ACGIH, American Conference of Governmental Industrial Hygienists.
- Exposure limits may vary from time to time and from one jurisdiction to another. Check with local regulatory agency for the exposure limits in your area.
- Production code EFSPE80057 is Halogen Free.

4. The first-aid procedures

First-aid method for different exposure as follows:

- Inhalation:** Remove victim to fresh air. If breathing is difficult a trained person may administer oxygen at a rate of 10 to 15 litres per minute. If breathing has stopped administer artificial respiration by use of a pocket mask or bag valve mask. Do NOT give mouth-to-mouth artificial respiration. Get medical attention immediately.
- Skin Contact:** Immediately wash skin with soap and copious amounts of water for at least 15 minutes. Remove contaminated clothing and administer a safety shower if contamination of the torso or legs above the knee has occurred. Relief from pain and swelling may be obtained by applying topical ointments after washing. Seek immediate medical advice if significant areas of the body have been affected, or if a severe skin reaction occurs. Treatment must be immediate due to the formation of hydrofluoric acid on moist skin. Launder clothing before reuse and discard leather footwear. Soak permeable belongings in benzalkonium chloride after washing.
- Eye Contact:** Immediately flush eyes with large volumes of water for at least 15 minutes, holding eyelids open while flushing. Care must be taken not to cross contaminate the eyes. In all cases of eye contact seek immediate medical attention. Continue to flush during transport to a medical facility.

Ingestion: Do not give anything by mouth to a victim who is either unconscious or is losing consciousness. If swallowed, wash mouth with water and have victim spit the wash water out. Repeat. Give one to two glasses of water to wash the throat. Do NOT induce vomiting. If vomiting occurs naturally, have victim lean forward to avoid aspiration. Seek medical attention.

The most important symptoms and hazardous effects: Not applicable

The protection of first-aiders Notes to physicians: If battery is leaking it may be extremely corrosive, HF is produced upon combustion. Demand to use Ca-gluconate cream or liquid for first-aid.

5. Fire Fighting procedures

Suitable fire extinguishing media: Dry chemical, alcohol foam, water or carbon dioxide. For incipient fires, carbon dioxide extinguishers are more effective than water.

Specific hazards may be encountered during fire-fighting: Temperature over 100°C (212°F) batteries may burst and release hazardous.

Specific fire-fighting program: Rapidly cool batteries and adjacent structures with water.

Special equipment for the protection of firefighters: Use SCBA (self-contained breathing apparatus) and full protective gear.

Other: (Decomposition products when exposed to a fire situation.)

This information is given for the use of professional fire fighters responding to a warehouse fire where fire from other materials may incinerate Molicels. This section is provided solely in case of exposure, during fire fighting, to the combustion by-products. Hydrofluoric acid is not present in the product. Contact with Molicels causes none of the following symptoms.

Hydrofluoric acid is extremely corrosive. Contact with hydrogen fluoride fumes is to be avoided. Permissible exposure limit is 3 ppm. In case of contact with hydrogen fluoride fumes, immediately leave the area and seek first aid and emergency medical attention. Symptoms may have delayed onset. Fluoride ions penetrate skin readily causing destruction of deep tissue layers and even bone. Fluoride interferes with nerve impulse conduction causing severe pain or absence of sensations. Immediately flush eyes or skin with water for at least 20 minutes to neutralize the acidity and remove some fluoride.

Remove and destroy all contaminated clothing and permeable personal possessions.

Before re-use, impermeable possessions should be soaked in benzalkonium chloride after water washing. Following flushing of the affected areas, an iced aqueous solution of benzalkonium chloride or 2.5 % calcium gluconate gel should be applied to react with the fluoride ion. Compresses and wraps may be used for areas where immersion is not practical. Medicated dressing should be changed every 2 minutes. Exposure to hydrofluoric acid fumes sufficient to cause pain requires immediate hospitalization for monitoring for pulmonary edema.

6. Spill disposal procedures

Overview: Evacuate area if fire is present or likely. Spills of this electrolyte from cells pose a risk to the safety of responders if water is present. Contact with water causes the production of extremely toxic and corrosive hydrofluoric acid. Remove all sources of ignition. Electrolyte will remove or soften painted surfaces causing slipperiness to be a hazard.

Personal precautions: For all spills, protect skin and eyes from contact with electrolytes. In all cases, wear self-contained breathing apparatus.

Environmental precautions:

Prevent from migration into natural waterways. Absorb spilled material with non-reactive absorbent such as vermiculite, clay or earth.

Clean-up procedures:

Evacuate spill area immediately and remove sources of ignition. Do NOT touch spilled material. Clean-up personnel must be trained in the safe handling of this product. If possible ventilate area by means of non-sparking, grounded ventilation system. Spills may be absorbed on non-reactive absorbents such as vermiculite. Place cells into individual plastic bags and then place into appropriate containers and close tightly for disposal. Ensure that clean-up procedures do not expose spilled material to any moisture. Immediately transport closed containers outside.

Lined steel drums are suitable for storage of damaged cells until proper disposal can be arranged.

7. Safe handling and storage procedures

Handling procedures: This product is flammable and corrosive. Reaction products with water are also toxic.

Eliminate all ignition sources, (e.g. sparks, open flames, hot surfaces). Keep away from heat. Post "NO-SMOKING" signs. It is very important to keep areas where this material is used clear of other materials which can burn (e.g., cardboard, sawdust).

Use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas of use. To prevent sparking, generously wet hard surfaces before they are chipped, ground, etc, in potentially hazardous areas. Keep aisles and exits free of obstruction. Do not use with incompatible materials such as water, strong oxidizing agents, strong reducing agents, strong acids and strong alkalis. Avoid generating vapour or mists. Prevent the release of vapour and mists into the workplace air. To avoid splashing, carefully dispense into sturdy containers made of compatible materials. Never transfer liquids by pressurizing the original shipping containers with air or inert gas. Do not dispense in storage area unless dispensing area is segregated by fire-resistant construction. Ground all drums, transfer vessels, hoses and piping. Ground clips must contact bare metal. When dispensing in other than a closed system, ensure dispensing container is bonded to receiving transfer equipment and container. Never return contaminated material to its original container. Label containers. Keep containers closed when not in use. Avoid damaging containers. Empty containers may contain hazardous residues.

Storage:

Store in a cool, dry, well-ventilated area, out of direct sunlight and away from heat and ignition sources. Keep storage area clear of burnable materials (e.g. old rags, cardboard). Lighted cigarettes, matches, or any other ignition sources should not be allowed around indoor or outdoor storage areas. Inspect all incoming containers to make sure they are properly labelled and not damaged. Keep quantity stored as small as possible. Store away from water, strong oxidizing agents, strong reducing agents, strong acids and strong alkalis. Store in suitable, labelled containers (usually the shipping container). Keep containers tightly closed. Avoid stacking of containers. Protect from damage. Keep empty containers in separate storage area. Empty containers may contain hazardous residues. Keep closed. Store small quantities in approved fireproof flammables cabinet or storage room. Store flammable materials according to occupational health and safety regulations and fire and building codes, which will describe the kind of storage area and the type of storage containers for a specified amount of the material.

Store in an isolated fireproof building, if possible. Ground floor storage facilities are usually recommended. Storage facilities should be made of fire resistant materials. Use a grounded, non-sparking ventilation system, approved explosion-proof equipment and intrinsically safe electrical systems. Store within temperature range recommended by electrolyte manufacturer/supplier. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Keep storage area separate from work areas. Store away

from work process and production areas, elevators, building and room exits or main aisles leading to exits. Post warning signs. Inspect periodically for damage or leaks. Have appropriate fire extinguishers and spill clean-up equipment in or near storage area.

8. Exposure controls procedures

Control parameters

Engineering control: General ventilation under normal use conditions

8-Hour TWAs: None

Short-term exposure limits: None

Maximum exposure limits: None

Biological mark: None

Personal protective equipment

Respiratory protection: None under normal use conditions.

Hand protection: None under normal use conditions.

Eye protection: None under normal use conditions. Wear safety glasses when handling leaking batteries.

Skin and body protection: None under normal use conditions. Use butyl gloves when handling leaking batteries.

Other: Keep batteries away from small children.

Hygiene methods: Use water cleaning-up.

9. Physical and Chemical Properties

Physical phase: Solid.

Colour: Contents silver in colour.

Odour: None

Boiling point /boiling range: NA°C.

Melting point: NA°C.

pH value: NA.

Decomposition temperature: NA°C.

Flash point: NA°C

Test method: open cup/close cup.

Ignition temperature: NA°C.

**Explosion limits
(LEL/UEL)** NA%/NA%.

Vapour pressure: 1.1-1.3 kPa @ 20°C.

Vapour density: 3.5.

Relative density: 1.2kg/litre.

Solubility: Miscible in water.

10. Stability and Reactivity

Possible hazardous reactions occurring under specific conditions: Contents incompatible with strong oxidizing agents.

Conditions to avoid: Does not water, heat, crush, disassemble or short circuit.

Materials to avoid: Water, heat, acid material.

Hazardous decomposition products: Hydrogen Fluoride, Phosphorus Oxides, Carbon Monoxide, Carbon Dioxide, Lithium Hydroxide, Cobalt Oxides, Aluminium Oxide, possible fluoro-compounds, Carbon soot.

11. Toxicological Information

Acute toxicity: None.

Local effects: None.

Sensitization: None.

Chronic toxicity or long term toxicity: None

Specific effects: None.

12. Ecological Information

Possible environmental effects/environmental mobility:

Abandons the battery to bury underground possibly creates the subsoil and the ground water

pollution. These batteries pass the U. S. EPA's Toxicity Characteristic Leaching Procedure and therefore, may be disposed of with normal waste.

Environmental toxicity: No data available.

Biodegradability: No data available.

13. Waste disposal procedures

Always consult and obey all international, federal, provincial/state and local hazardous waste disposal laws. Some jurisdictions require recycling of this spent product.

Canadian Environmental Protection Act: Spent cells are not considered hazardous waste. Cells involved in a fire may be considered to be hazardous waste. Comply with all provincial and local regulations.

Resource Conservation and Recovery Act (RCRA): Spent cells are not considered hazardous waste. Cells involved in a fire may be considered to be hazardous waste. Comply with all state and local regulations.

14. Transport Information

Canadian Transportation of Dangerous Goods Regulations: These cells must be tested and pass in accordance with the United Nations Manual of Tests and Criteria, Part III subsection 38.3. Not regulated for transport under Special Provision 34 of the Canadian Transport of Dangerous Goods Regulations

United States Hazardous Materials Regulations (49 CFR): These cells have passed the tests listed in the United Nations Manual of Tests and Criteria, Part 38.3. Not regulated for transport by Special Provision 188 of the United States Code of Federal Regulations Title 49.

International Air Transport Association (IATA): These cells must be tested and pass in accordance with the United Nations Manual of Tests and Criteria, Part III subsection 38.3.

These cells must be packaged in accordance with packing instruction UN 3480 PI965 Section II - Packages require lithium battery. The outside of each package that contains Lithium Cells/Batteries must be marked. The text: "Not Restricted" additional handling information on the air waybill. Consignments require lithium battery document. A shipper must document the shipment using a Shipper's Declaration for Dangerous Goods.

IMP: ELI. Cell: < 20Wh. Battery/pack: < 20Wh.

PAX limit: 10kg G/package. CAO limit: 10kg G/package.

These cells must be packaged in accordance with packing instruction UN 3480 PI965 Section I - A completed package must display a Class 9 hazard label in addition to markings that identify the applicable proper shipping name and UN number. Consignments require DGD UN specification package require. A shipper must document the shipment using a Shipper's Declaration for Dangerous Goods.

IMP: RLI. Cell: > 20Wh. Battery/pack: > 20Wh.

PAX limit: 5kg G/package. CAO limit: 35kg G/package.

Acceptable to dangerous goods locations where Packing Instruction 965 UN3480 is not prohibited. Cells equal to or less than 20Wh; and batteries equal to or less than 100Wh.

Packing requirements:

General packing requirement: Cells and batteries must be packed in strong outer packaging that conform to 2.7.5

Additional requirements:

1. Cells and batteries must be packed in inner packaging that completely enclose the cell or battery.
2. Cells and batteries must be protected so as to prevent short circuits.
3. Each package must be capable of withstanding a 1.2m drop test in any orientation without damage to cells or batteries contained therein, shifting of the contents so as to allow battery to battery contact and release of contents.

Each package must be labelled with a lithium battery handling label.

Limitation of weight:

Quantity per package for both Passenger Aircraft and Cargo Aircraft can only have 10Kg in gross weight.

Overpacks:

Individual packages each complies with the requirements of part 1 may be placed in an overpack. An overpack must be marked with the Word "Overpack" and labelled with the lithium battery label, unless the labels on the package inside the overpack are visible.

International Maritime Organization (IMO):

These cells have passed the tests listed in the United Nations Manual of Tests and Criteria, Part 38.3. Not regulated for transport under Special Provision 188 of the International Maritime Dangerous Goods Code (IMDG).

UN 3480 - Lithium ion batteries

UN 3481 - Lithium ion batteries packed with equipment/Lithium ion batteries contained in equipment

Any Lithium ion cells or batteries subsequently repackaged or reshipped are required to meet all of the requirements specified above.

15. Regulatory Information

Applicable regulations: Local hazardous waste disposal laws. This product is made from materials with no detectable mercury.

Canadian federal regulations

Canadian Environmental

Protection Act: All ingredients in the electrolyte are on the Domestic Substances List.

WHMIS Classification: Not controlled, manufactured article.

United States federal regulations

Toxic Substances

Control Act: All ingredients are listed in the inventory.

OSHA: Does not meet criteria as per Part 1910.1200, manufactured article.

CERCLA: Does not meet criteria.

SARA 313: Does not meet criteria.

SARA 311/312 EPA

Hazard Categories: Does not meet criteria.

EU Regulations

EINECS: Not applicable

EU Classification: Not classifiable

Labels: None

16. Other information

Literature references:

1. Local waste disposal laws.
2. The UN Manual of Tests and Criteria
3. 2008 The Emergency Response Guidebook
4. 53rd IATA DANGEROUS GOODS REGULATIONS

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