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MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

- Product Name : Lithium Ion Rechargeable Battery Pack
- Product code : PC-14(ENDURA ELITE,ELITE-S),
E-10, E-10S, E-7, E-7S, E-80, E-80S, E-50, E-50S,
NP-L7, NP-L7S, NP-L50, NP-L50S, NP-L46, NP-L40,
NP-L40S
SSL-VBG50
- Company Name : IDX Company, Ltd.
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2. COMPOSITION / INFORMATION ON INGREDIENTS

- Substance or preparation: Preparation

- Information about the chemical nature of product:

Common chemical name / General name	CAS number	Concentration / Concentration range	Classification and hazard labeling
Lithium Cobaltite (LiCoO ₂)	12190-79-3	25-40%	-
Iron	7439-89-6	15-25%	-
Aluminum	7429-90-5	2-6%	-
Graphite (Natural graphite) (Artificial graphite)	7782-42-5 7740-44-0	10-20%	-
Copper	7440-50-8	5-15%	Sensitization of the skin group No.2
Organic electrolyte	-	10-20%	Inflammable liquid
Poly-(4,4'isopropyliden diphenyl carbonate) 4,4'isopropylidenediphenyl carbonate 1,1,1-tris(4-hydroxyphenyl) ethane copolymer	25971-63-5	95.0 % <	
Proprietary ingredients		5.0 >	

3. HAZARDS IDENTIFICATION

For the battery cells, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous material's leakage.

However, if exposed to a fire, added and chemical shocks, decomposition, added electric stress by misuse, the gas release vent will be operated. The battery pack case will be breached and extreme, hazardous materials may be released.

Moreover, if heated strongly by the surrounding fire, acid gas may be emitted.



- Most important hazard and effects

Human health effects:

Inhalation: The steam of the electrolyte has an anesthetic action and stimulates the respiratory tract.

Skin contact: The steam of the electrolyte stimulates the skin. Electrolyte-skin contact causes soreness and stimulation to the skin.

Eye contact: The steam of the electrolyte stimulates eyes. Electrolyte-eye contact causes soreness and stimulation to the eye. In certain cases, there may be substances that cause a strong inflammation of the eyes.

Environmental effects: Since a battery pack remains in the environment, do not throw out it into the environment.

For the molding case, the materials are not all under the category of dangerous/hazardous substances.

4. FIRST-AID MEASURES

A battery cell, spilled internal cell materials and molding case

- Inhalation:

Make the victim blow his/her nose; gargle. Leave contaminated area and breathe fresh air. If coughing, difficult breathing, or any other symptoms develop, seek medical attention if necessary.

- Skin contact:

Remove contaminated clothes and shoes immediately. Wash extraneous matter or contact region with soap and plenty of water immediately.

If contact with molten product occurs, treat as for thermal burn. Do not try to peel molten polymer from the skin. Seek medical attention.

- Eye contact:

Do not rub eyes. Immediately flush eyes with water continuously for at least 15 minutes.

Seek medical attention immediately.



- Ingestion:

Make the victim vomit. If regurgitation is unsuccessful or the victim remains ill after vomiting, seek medical attention immediately.

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.
Also, combustion products may include intense heat and high levels of black smoke containing, carbon monoxide and carbon dioxide. Formation of traces of aliphatic and aromatic hydrocarbons, aldehyde, acids, phenol and phenol derivatives may occur.

- Specific methods of fire-fighting : When the battery burns with other combustibles simultaneously, use the fire-extinguishing method, which corresponds to combustibles. Extinguish fire from an upward position if possible, with the fire downwind.

For the molding case, water spray is the preferred extinguishing medium. Use water spray to cool fire exposed surfaces, protect personnel, and extinguish the fire. Respiratory and eye protection is required for fire-fighting personnel.

- 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 cloth



6. ACCIDENTAL RELEASE MEASURES

Spilled internal cell materials, such as electrolyte leaked from a battery cell, are carefully dealt with according to the following.

- Precautions for human body : Remove spilled materials with protective equipment (protective glasses and protective gloves). Do not inhale the gas as much as possible. Moreover, avoid touching as much as possible.
- Environmental precautions : Do not throw out into the environment.
- Method of cleaning up : The spilled solids are put into a container. The place that was leaked on is wiped off with dry cloth.
- Prevention of secondary hazards : Avoid re-use. Do not bring the collected materials close to fire.

In general for molding case:

Sweep or gather up product and place in proper container for disposal or recovery. Do not discard in sewers or waterways because fish may eat pellets, resulting in obstruction of their digestive tracts.

7. HANDLING AND STORAGE

- Handling

-Cell technical measures:

- Prevention of user exposure : Not necessary under normal use.
- Prevention of fire and explosion : Not necessary under normal use.
- Precaution for safe handling : Do not damage or remove the external tube.
- Specific safe handling advice : Never throw out cells in a fire or expose to high temperatures. Do not soak in water or seawater. Do not expose to strong oxidizers. Do not give a strong mechanical shock or charge. Never disassemble, modify, or deform. Do not connect the positive terminal to the negative with electrically conductive material. In the case of charging, use only dedicated charger or charge according to conditions specified by IDX.



-For molding case:

Prevent contact with skin and eyes. Use good industrial hygiene practices. Provide adequate ventilation. If product is powder and transports with air, take precautions in order to prevent explosion.

- Storage

Cell Technical measures:

Storage conditions (suitable, to be avoided) : Avoid direct sunlight, high temperature, high humidity. Store in cool place (temperature: -20 ~ 35 degree C, humidity: 45 ~ 85%).]

Incompatible products : Conductive materials, water, seawater, strong oxidizers and strong acids.

Packing material (recommended, not suitable) : Insulate and tear proof materials are recommended.

For molding case:

Store in a dry place away from moisture, excessive heat and sources of ignition.



8. EXPOSURE CONTROL / PERSONAL PROTECTION

- Engineering measures

No engineering measure is necessary during normal use. In case of internal cell materials' leakage, operate the local exhaust or improve ventilation.

- Control parameters

Common chemical name / General name	ACGIH (2002)		OSHA
	TLV-TWA	BEI	PEL
Lithium Cobaltite (LiCoO ₂)	0.02mg/m ³ (as cobalt)	-	-
Aluminum	10mg/m ³ (metal coarse particulate) 5mg/m ³ (inflammable powder) 5mg/m ³ (weld fume)	-	-
Carbon (Natural graphite) (Artificial graphite)	2mg/m ³ (inhalant coarse particulate)	-	-
Copper	0.2mg/m ³ (fume) 1.0mg/m ³ (a coarse particulate, Mist)	-	-
Organic electrolyte	-	-	-
Nuisance dust	10 mg/m ³ (total dust)		5mg/m ³ (respirable dust) 15mg/m ³ (total dust)

ACGIH : American Conference of Governmental Industrial Hygienists, Inc.

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

BEI : Biological Exposure Indices

OSHA : Occupational Safety & Health Administration

PEL : Permissible Exposure Limits

- Personal protective equipment

- 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



- Ventilation : A continuous supply of fresh air to the workplace together with removal of processing fumes through exhaust systems is recommended. Processing fumes may contain small amounts of carbon dioxide, diphenyl-carbonate, phenol and substituted phenols. Ventilation requirements must be locally determined to limit exposure to materials at their point of use.

9. PHYSICAL AND CHEMICAL PROPERTIES

- For cell

- Appearance
- Physical state : Solid
- Form : Cylindrical
- Color : Metallic color (without tube)
- Odor : No odor
- pH : N/A
- Specific temperatures/temperature ranges at which changes in physical state occur : There is no useful information for the product as a mixture.
- Flash point : N/A
- Explosion properties : N/A
- Density : N/A
- Solubility with indication of the solvent(s): Insoluble in water

- For molding case

- Appearance
- Physical state : Solid
- Odor and appearance : Pellet
- Boiling point : Not applicable
- Melting point : 220 – 230 °C <
- Vapor pressure (Torr) : Negligible
- Vapor density (air=1) : Not applicable
- Specific gravity (Water=1) : 1.2
- pH : Not applicable
- Water solubility : Insoluble
- Volatiles : Negligible



10. STABILITY AND REACTIVITY

- Stability : Stabilize under recommended conditions of storage and handling.
- Hazardous reactions occurring under specific conditions:
 - For cell:
 - Conditions to avoid : When a battery cell is exposed to an external short-circuit, crushes, deformation, high temperature above 100 degrees Celsius, it will be the cause of heat generation and ignition. Direct sunlight and high humidity.
 - Materials to avoid : Conductive materials, water, seawater, strong oxidizers and strong acids.
 - Hazardous decomposition products : Acid or harmful gas is emitted during fire.
- For molding case:
 - Not reactive under recommended conditions of storage, handling, processing and use.

11. TOXICOLOGICAL INFORMATION

For internal cell materials:

Lithium cobaltite – LiCoO₂

- Acute toxicity : No applicable data.
(Reference cobalt: LDLo, oral – Guinea pig 20mg/kg)
- Local effects : Unknown.
- Sensitization : The nervous system of respiratory organs may be stimulated sensitively.
- Chronic toxicity / Long term toxicity : By the long-term inhalation of coarse particulate or vapor of cobalt, it is possible to cause the serious respiratory-organs disease. Skin reaction or a lung disease for allergic or hypersensitive person may be caused.
- Skin causticity : Although it is very rare, the rash of the skin and allergic erythema may result.

Aluminum

- Local effects: Aluminum itself has no toxicity. When it comes in contact with skin, dermatitis may be caused.
- Chronic toxicity / Long term toxicity: Long-term inhalation of coarse particulate or fumes may result in lung damage.



Graphite

- 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 palpebra 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

- 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

For molding case:

ACUTE ORAL LD₅₀: Not available

The components of this product are not hazardous under OSHA Hazard communication.

(29 CFR 1919. 1200)



12. ECOLOGICAL INFORMATION

- Persistence / degradability:

Since a battery cell and the internal materials remain in the environment, do not bury or throw out into the environment.

For molding case: Relevant information is not available.

13. DISPOSAL CONSIDERATIONS

- Recommended methods for safe and environmentally preferred disposal:

Product (waste from residues)

Do not throw out a used battery cell. Recycle it through the recycling company.

Contaminated packaging

Neither a container nor packing is contaminated during normal use. When internal materials leaked from a battery cell contaminates, dispose as industrial wastes subject to special control.

- Waste disposal:

Efforts to recycle material should be made. If unable to use recycle, material should be buried in approved landfill or incinerated in accordance all applicable with federal, state and local regulations.

14. TRANSPORT INFORMATION

In the case of transportation, avoid exposure to high temperatures and prevent the formation of any condensation. When being transported, avoid falls, drops, and breakage. Prevent collapse of cargo piles. Prevent any wetness due to rain. The container must be handled carefully. Do not give shocks that result in a mark of hitting on a cell. Please refer to Section 7 – HANDLING AND STORAGE also.

- UN classification: However this product's shipping name is "Lithium ion batteries" (or Lithium ion Batteries packed with equipment" or "Lithium ion Batteries contained in equipment"), it is not recognized as "DANGEROUS GOODS" when its transport condition accords with the following IATA-DGR;

- PI965 Section II - Excepted Lithium Ion Cells and Batteries and the Additional Requirements of Section II

- PI966 Section II - Excepted Lithium Ion Cells and Batteries and the Additional Requirements of Section II

- PI967 Section II - Excepted Lithium Ion Cells and Batteries and the Additional Requirements of Section II

- Special provision 188 of IMO-IMDG Code



15. REGULATORY INFORMATION

- Regulations specifically applicable to the product:
 - IATA-DGR (air transportation)
 - IMO-IMDG Code (sea transportation)
 - US Department of Transportation 49 Code of Federal Regulations [USA]
 - Wastes Disposal and Public Cleaning Law [Japan]
 - Law for Promotion of Effective Utilization of resources [Japan]
 - Chemical Substance Inventory requirements of the US EPA Toxic Substances Control Act

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.
- IDX makes no warranty, expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. IDX assumes no responsibility for injury from the use to the product described herein.

- Reference

Dangerous Goods Regulations – 52nd Edition Effective 1 January 2011: International Air Transport Association (IATA)

MSDS of raw materials prepared by the manufactures

7th edition: February 16, 2011

Prepared and approved by
Engineering Dept., Products Div.
IDX Company, Ltd.

