

Material Safety Data Sheet

Product Name: Lithium-ion Battery

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Date/Revised: 2 January 2025

File No. MSDS-VTE-LIION-CN01

Revision: 9

1- PRODUCT NAME Lithium-Ion Battery (including Lithium-Ion Polymer Battery)

2- COMPOSITION/INFORMATION ON INGREDIENTS

Substance or preparation: Preparation.

Information about the chemical nature of products

Chemical name	CAS N°	Concentration/Concentration range	Classification and Hazard Labelling
LiCoO ₂	12190-79-3	25-40%	-
Iron	7439-89-6	15~25%	-
Aluminum	7429-90-5	2~6%	-
Graphite	7782-42-5	10~20%	-
Organic Electrolyte	n.a.	10~20%	Inflammable liquid

3 – HAZARDS IDENTIFICATION

Health Hazards (Acute and Chronic):

These chemicals are contained in a sealed can. The risk of exposure occurs only if the battery is mechanically or electrically abused. The most likely risk is acute exposure when the gas release vent works. Organic solvents have slight toxicity and can irritate skin and eyes. Lithium salt is irritating to skin, eyes, and mucous membranes and should be avoided.

Carcinogenicity: NTP: None

IARC Monograph: None

OSHA

Regulated: None

Medical Conditions Generally Aggravated by Exposure: An acute exposure will not generally aggravate any medical condition.

Emergency and Fires Aid Procedures: In case of skin contact with battery contents, flush immediately with water. For eye contact, flush with copious amounts of water for 15 minutes. Do not inhale leaked material. if irritation persists, get medical help.

4 – FIRST AID MEASURES

Spilled internal cell materials

Inhalation: Make the victim blow his/her nose and gargle. 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.

Eye contact: Do not rub one's eyes. Immediately flush your eyes with water continuously for at least 15 minutes. Seek medical attention immediately

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Ingestion: Make the victim vomit. When it is impossible, or the feeling is not well after vomiting, seek medical attention.

5 – FIRE-FIGHTING MEASURES

Extinguishing media: Plenty of water, CO₂ gas, nitrogen gas, chemical powder fire extinguishing medium and fire foam.

Special hazards: Corrosive gas may be emitted during a fire.

Special fire-fighting methods: When the battery burns with other combustibles simultaneously, use the fire extinguishing method that corresponds to the combustibles. Extinguish a fire from the windward as much as possible.

Special protective equipment for firefighters: 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

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

Precautions for the human body:

Remove spilt materials with protective equipment (protective glasses and protective gloves). Do not inhale the gas as much as possible. Moreover, avoid touching with as much as possible.

Environmental precautions: do not throw out into the environment.

Method of cleaning up: The spilt solids are put into a container. The leaked place is wiped off with a dry cloth.

Prevention of secondary hazards: Avoid re-scattering. Do not bring the collected materials close to the fire.

7 – HANDLING AND STORAGE

Handling:

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 them to high temperatures. Do not soak cells in water or seawater. Do not be exposed to strong oxidisers. Do not give a strong mechanical shock or fling. Never disassemble, modify, or deform. Do not connect the positive and negative terminals with electrically conductive material. In the case of charging, use only

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a dedicated charger according to the conditions specified by Vapex.

Storage:

Technical measures

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

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

Packing material (recommended, not suitable): Insulative and tearproof materials are recommended.

8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering measures:

No engineering measure is necessary during normal use. However, in case of internal cell material leakage, the local exhaust must be operated or ventilation improved.

Control parameters

Chemical name	ACGIH (2002)	
	TLV-TWA	BEI
LiCoO ₂	0.02mg/m ³ (as cobalt)	-
Aluminum	10 (metal coarse particulate) 5 (flammable powder) 5 (weld fume)	-
Graphite	2 (Inhalant coarse particulate)	-
Organic Electrolyte	1.0 (a coarse particulate, Mist)	-

ACGIH: American Conference of Governmental Industrial Hygienists, Inc.

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

BEI: Biological Exposure indices

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: Protective cloth:

9 – PHYSICAL AND CHEMICAL PROPERTIES

8.1 Appearance: (Physical shape and color as supplied)

Prismatic positive/negative stack, heat sealed with a laminated aluminum packing film.

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8.2 Temperature range:

There is no useful information for the products as a mixture.

Flash Point: N.A.

Explosion properties: N.A.

Density: N.A.

Solubility, with indication of the solvent(s): Insoluble in water.

10 – STABILITY AND REACTIVITY

Stability: Stable under normal use.

Hazardous reactions occurring under specific conditions:

Conditions to avoid: When a battery is exposed to an external short-circuit, crushes, deformation, or high temperature above 100 °C, 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 a fire.

11 – TOXICOLOGICAL INFORMATION

There is no available data on the product itself. The information on the internal cell material is as follows.

Lithium Cobaltate-LiCoO₂

Acute toxicity: No applicable data

Reference cobalt; LDLo, oral-Guinea pig 20mg/kg

Local effects: Unknown

Sensitisation:

The nervous system of respiratory organs may be stimulated sensitively.

Chronic toxicity/Long term toxicity:

Long-term inhalation of coarse particulate or vapour of cobalt can cause severe respiratory-organ disease. Skin reaction or lung disease for an allergic or hypersensitive person may be caused.

Skin causticity: Although it is very rare, a rash of the skin and allergic erythema may result.

Aluminum

Local effects: Aluminum itself is not toxic. However, when it enters a wound, it may cause dermatitis.

Chronic toxicity/Long term toxicity:

By the long-term inhalation of coarse particulate or vapor or fume, it is possible to

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cause lung damage (aluminum lungs).

Graphite

Acute toxicity: Unknown

Local effects: When it goes into one's eyes, it stimulates one's eyes; conjunctivitis, The thickening of the corneal epithelium or edematous inflammation of the palpebra may be caused.

Chronic toxicity/Long term toxicity:

By 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 recognised as a cause of cancer by research organizations and natural toxic substance research organizations of cancer.

12 – ECOLOGICAL INFORMATION

Persistence/degradability:

Since batteries and their internal materials remain in the environment, they are not buried or thrown out into it.

13 – DISPOSAL CONSIDERATIONS

Recommended methods for safe and environmentally preferred disposal:

Product (waste from residues)

Do not throw out a used battery. 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 contaminate, dispose of them as industrial wastes subject to special control.

14 – 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 [USD]

15: TRANSPORTATION INFORMATION

In the case of transportation, avoid exposure to high temperatures and prevent the formation of any condensation. Take in their cargo without falling, dropping, and breaking. Prevent the collapse of cargo piles that are wet from 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.

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UN classification: However, this product's shipping name is "Lithium batteries" (or "Lithium Batteries packed with equipment" or "Lithium Batteries contained in equipment"), and it is not recognised as "DANGEROUS GOODS" when its transport condition accords with "special provision Section II of PI965 of IATA DGR" or "special provision 188 of IMP-IMDG Code, UN Number: UN3480 & UN3481.

It also complies with the IATA DGR 61st Edition provision and is not classified as dangerous under the current edition.

Transportation conditions shipped from Vapex meet these special provisions.

Each Vapex battery has been tested according to the provisions of the UN Manual of Tests and Criteria, Part III, Sub-section 38.3.

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 the product's health, safety, and environmental aspects and should not be construed as any guarantee of technical performance or suitability for particular applications.