

SAFETY DATA SHEETS

This SDS packet was issued with item:

071153840

The safety data sheets (SDS) in this packet apply to the individual products listed below. Please refer to invoice for specific item number(s).

071141035 071153782 071153790 071153808 071153824 071153832 071153865 071153899

Safety data sheet for chemical products (SDS)

1. PRODUCT AND COMPANY IDENTIFICATION

- Product name: Lithium Ion Battery Cell
- Product code: Cylindrical type cell
UR14430Y, UR18650S, UR18650SA, UR18650SAX, UR18650Y, UR18650W
- Company name: Sanyo Electric Co., Ltd. Mobile Energy Company
- Address: 222-1, Kaminaizen, Sumoto City, Hyogo, Japan
- Telephone number: +81-799-24-4111
- Fax number: +81-799-24-4121
- Emergency telephone number: [Weekday] +81-799-23-3942
[Night and holiday] +81-799-24-4131

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 Transition Metal Oxide (Li(Mn-Co-Ni)O ₂)	-	15-25%	-
Lithium Manganate (LiMn ₂ O ₄)	12057-17-9	15-25%	-
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

3. HAZARDS IDENTIFICATION

For the battery cell, 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 materials' leakage.

However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by miss-use, the gas release vent will be operated. The battery cell case will be breached at the extreme, hazardous materials may be released.

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

- Most important hazard and effects

Human health effects:

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

Skin contact: The steam of the electrolyte stimulates a skin. The electrolyte skin contact causes a sore and stimulation on the skin.

Eye contact: The steam of the electrolyte stimulates eyes. The electrolyte eye contact causes a sore and stimulation on the eye. Especially, substance that causes a strong inflammation of the eyes is contained.

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

- Specific hazards:

If the electrolyte contacts with water, it will generate detrimental hydrogen fluoride.

Since the leaked electrolyte is inflammable liquid, do not bring close to fire.

4. FIRST-AID MEASURES

Spilled internal cell materials

- Inhalation:
Make the victim blow his/her nose, 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 eyes with water continuously for at least 15 minutes. Seek medical attention immediately.

A battery cell and spilled internal cell materials

- Ingestion:
Make the victim vomit. When it is impossible or the feeling is not well after vomiting, 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 correspond 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 cloth

6. ACCIDENTAL RELEASE MEASURES

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

- 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 with 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 leaked place is wiped off with dry cloth.
- Prevention of secondary hazards: Avoid re-scattering. Do not bring the collected materials close to 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 to high temperatures. Do not soak cells in water or seawater. Do not expose to strong oxidizers. Do not give a strong mechanical shock or fling. Never disassemble, modify or deform. Do not connect the positive terminal to the negative terminal with electrically conductive material. In the case of charging, use only dedicated charger or charge according to the conditions specified by Sanyo.

▪ Storage

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): Insulative and tear proof materials are recommended.

8. EXPOSURE CONTROLS / 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)	
	TLV-TWA	BEI
Lithium Transition Metal Oxide (Li(Mn-Co-Ni)O ₂)	0.02mg/m ³ (as cobalt)	-
Lithium Manganate (LiMn ₂ O ₄)	0.2mg/m ³ (as manganese)	-
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	-	-

ACGIH: American Conference of Governmental Industrial Hygienists, Inc.

TLV-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: Working clothes with long sleeve and long trousers

9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance
Physical state: Solid
Form: Cylindrical
Color: Metallic color (without tube)
Odor: No odor
- pH: NA
- Specific temperatures/temperature ranges at which changes in physical state occur:
There is no useful information for the product as a mixture.
- Flash point: NA
- Explosion properties: NA
- Density: NA
- 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 cell is exposed to an external short-circuit, crushes, deformation, high temperature above 100 degree 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: 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 transition metal oxidate - Li(Mn-Co-Ni)O_2 , Lithium manganate - LiMn_2O_4 ,

- Acute toxicity: No applicable data.
 - Reference cobalt: LDLo, oral - Guinea pig 20mg/kg
 - manganese: LD50, oral - Guinea pig 9000mg/kg
 - nickel: LDLo, oral - Guinea pig 5mg/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.
 - By the long-term or repetitive inhalation of coarse particulate of Manganese Oxide (MnO_2), lungs and nervous system may be affected; bronchitis, pneumonia, nerve disease or nerve mental disorder (manganese poisoning) may be caused.
 - Nickel Compounds belong to the 1st group of the carcinogen in the IARC category (substance which has carcinogenic to man).
- 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 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

- 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

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.

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.
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14. TRANSPORT INFORMATION

In the case of transportation, avoid exposure to high temperature and prevent the formation of any condensation. Take in a cargo of them without falling, dropping and breakage. Prevent collapse of cargo piles and wet by 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 "packing instruction 965 part 1 of IATA-DGR" (or "packing instruction 966 part 1" or "packing instruction 967 part 1") or "special provision 188 of IMO-IMDG Code".
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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]
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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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- Reference
Chemical substances information: Japan Advanced Information center of Safety and Health
International Chemical Safety Cards (ICSCs): International Occupational Safety and Health Information Centre (CIS)
2002 TLVs and BEIs: American Conference of Governmental Industrial Hygienists (ACGIH)
Dangerous Goods Regulations - 50th Edition Effective 1 January 2009: International Air Transport Association (IATA)
IMDG Code - 2008 Edition: International Maritime Organization (IMO)
RTECS (CD-ROM)
MSDS of raw materials prepared by the manufactures
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First edition: Dec. 01 2003
Prepared and approved by
Sanyo Electric Co., Ltd.
Mobile Energy Company
Battery System Development Management Department

Safety data sheet for product

1. PRODUCT AND COMPANY IDENTIFICATION

- Product name: Lithium ion rechargeable battery cell
- Product code: None
(All models Sanyo manufactured and whose capacity is less than or equal to 5.4Ah, including the cell branded as Panasonic, excluding the cell whose shape is prismatic and two or more short / middle / long side excess 12mm/85mm/110mm.)
- Company name: Sanyo Electric Co., Ltd., Panasonic group
- Address: 222-1 , Kaminaizen, Sumoto City, Hyogo, Japan
- Telephone number: +81-799-24-4111
- Fax number: +81-799-23-2879
- Emergency telephone number: [Weekday] +81-799-23-3931 [Night and holiday] +81-799-24-4131

2. HAZARDS IDENTIFICATION

For the battery cell, chemical materials are stored in a hermetically sealed metal or metal laminated plastic 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 materials' leakage.

However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by miss-use, the gas release vent will be operated. The battery cell case will be breached at the extreme, hazardous materials may be released.

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

- GHS classification: Not available
(This product is outside the scope of GHS system since it's considered as an "article".)
- Most important hazard and effects
Human health effects:
Inhalation: The steam of the electrolyte has an anesthesia action and stimulates a respiratory tract.
Skin contact: The steam of the electrolyte stimulates a skin. The electrolyte skin contact causes a sore and stimulation on the skin.
Eye contact: The steam of the electrolyte stimulates eyes. The electrolyte eye contact causes a sore and stimulation on the eye. Especially, substance that causes a strong inflammation of the eyes is contained.
Environmental effects: Since a battery cell remains in the environment, do not throw out it into the environment.
- Specific hazards:
If the electrolyte contacts with water, it will generate detrimental hydrogen fluoride.
Since the leaked electrolyte is inflammable liquid, do not bring close to fire.

3. COMPOSITION / INFORMATION ON INGREDIENTS

- Substance or preparation: Preparation
- Information about the chemical nature of product: *1

Portion	Material name	Concentration range (wt %)
Positive electrode	Lithium transition metal oxidate ($\text{Li}[\text{M}]_m[\text{O}]_n$ *2)	20~60
Positive electrode's base	Aluminum	1~10
Negative electrode	Carbon	10~30
Negative electrode's base	Copper	1~15
Electrolyte	Organic electrolyte principally involves ester carbonate	5~25
Outer case	Aluminum, iron, aluminum laminated plastic	1~30

*1 Not every product includes all of these materials.

*2 The letter M means transition metal and candidates of M are Co, Mn, Ni and Al. One compound includes one or more of these metals and one product includes one or more of the compounds. The letter m and n means the number of atoms.

4. FIRST-AID MEASURES**Spilled internal cell materials**

- Inhalation:
Make the victim blow his/her nose, 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 eyes with water continuously for at least 15 minutes. Seek medical attention immediately.

A battery cell and spilled internal cell materials

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

5. FIRE-FIGHTING MEASURES

- 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 correspond 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 cloth

6. ACCIDENTAL RELEASE MEASURES

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

- 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 with 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 leaked place is wiped off with dry cloth.
- Prevention of secondary hazards: Avoid re-scattering. Do not bring the collected materials close to fire.

7. HANDLING AND STORAGE

- Handling suggestions
 - Do not connect the positive terminal to the negative terminal with electrical wire or chain.
 - Avoid polarity reverse connection when installing the battery to an instrument.
 - Do not wet the battery with water, seawater, drink or acid; or expose to strong oxidizer.
 - Do not damage or remove the external tube.
 - Keep the battery away from heat and fire.
 - Do not disassemble or reconstruct the battery; or solder the battery directly.
 - Do not give a mechanical shock or deform.
 - Do not use unauthorized charger or other charging method. Terminate charging when the charging process doesn't end within specified time.
- Storage
 - Do not store the battery with metalware, water, seawater, strong acid or strong oxidizer.
 - Make the charge amount 30~50% then store at room temperature or less (temperature= -20~35 degree C) in a dry (humidity: 45~85%) place. Avoid direct sunlight, high temperature, and high humidity.
 - Use insulative and adequately strong packaging material to prevent short circuit between positive and negative terminal when the packaging breaks during normal handling. Do not use conductive or easy to break packaging material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION (WHEN THE ELECTROLYTE LEAKS)

- Control parameters
 - ACGIH has not been mentioned control parameter of electrolyte.
- Personal protective equipment
 - Respiratory protection: Respirator with air cylinder, dust mask
 - Hand protection: Protective gloves
 - Eye protection: Goggles 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

- Appearance
 - Physical state: Solid
 - Form: Cylindrical or Prismatic or Pouch (laminated)
 - Color: Metallic color or black (without tube if it has tube)
 - Odor: No odor

10. STABILITY AND REACTIVITY

- Stability: Stable under normal use
- Hazardous reactions occurring under specific conditions
 - Conditions to avoid: When a battery cell is exposed to an external short-circuit, crushes, deformation, high temperature above 100 degree 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: Acrid or harmful gas is emitted during fire.

11. TOXICOLOGICAL INFORMATION

Organic Electrolyte

- Acute toxicity:
 - LD₅₀, oral - Rat 2,000mg/kg or more
- Irritating nature: Irritative to skin and eye

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.

13. DISPOSAL CONSIDERATIONS

• Recommended methods for safe and environmentally preferred disposal:

Product (waste from residues)

Specified collection or disposal of lithium ion battery is required by the law like as "battery control law" in several nations. Collection or recycle of the battery is mainly imposed on battery's manufacturer or importer in the nations recycle is required.

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.

14. TRANSPORT INFORMATION

In the case of transportation, avoid exposure to high temperature and prevent the formation of any condensation. Take in a cargo of them without falling, dropping and breakage. Prevent collapse of cargo piles and wet by 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 regulation

• UN number: 3480 (3481 when the battery is contained in equipment or packed with equipment)

• Proper shipping name:

Lithium ion batteries ("lithium ion batteries contained in equipment" or "lithium ion batteries packed with equipment")

• Class: 9 *

** Although this product meets the criteria of "dangerous goods" and are classified as "lithium ion batteries", depending on the battery's total capacity in the packaging, etc., they may not be subject to the fully regulated provisions.*

Regulation depends on region and transportation mode

• Worldwide - Air transportation:

ICAO/IATA-DGR [packing instruction 965 section IB or II]

(When shipping batteries "packed with" or "contained in" equipment, use packing instruction 966 or 967 as appropriate.)

• Worldwide - Ocean transportation:

IMO-IMDG Code [special provision 188]

• Europe - Ground transportation:

ADR [special provision 188]

** Instructions or provisions in the box brackets are conditions to make the battery cell exempted from full regulation.*

15. REGULATORY INFORMATION

• Regulations specifically applicable to the product:

Wastes Disposal and Public Cleaning Law [Japan]

Law for Promotion of Effective Utilization of resources [Japan]

US Department of Transportation 49 Code of Federal Regulations [USA]

** About overlapping regulations, please refer to Section 14-TRANSPORT INFORMATION.*

16. OTHER INFORMATION

- This safety data sheet is offered an agency who handles this product to handle it safely.
- The agency should utilize this safety data sheet effectively (put it up, educate person in charge) and take proper measures.
- ***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.

Reference

Dangerous Goods Regulations – 58th Edition Effective 1 January 2017: International Air Transport Association (IATA)

IMDG Code – 2016 Edition: International Maritime Organization (IMO)

The European Agreement concerning the International Carriage of Dangerous Goods by Road – 2017:

The United Nations Economic Commission for Europe (UNECE)

First edition:

Apr. 28, 2010

Prepared and approved by:

Technology Planning Department
Rechargeable Battery Business Division
Sanyo Electric Co., Ltd.
Panasonic group

Product Information Sheet

Panasonic Batteries

Panasonic Industrial Devices Sales Company of America
A Division Panasonic Corporation of North America
1701 Golf Road Suite 3-1100
Rolling Meadows, IL 60008
Toll Free: 877-726-2228
Fax: 847-468-5750
Internet: na.industrial.panasonic.com/products/batteries
e-mail: oembatteries@us.panasonic.com

Product: Lithium-ion Batteries
(Li-ion)

Applicable models/sizes: All Cylindrical
and Prismatic Lithium-ion batteries

Revision: – January 1, 2017

The batteries referenced herein are exempt articles and are **not** subject to the OSHA Hazard Communication Standard requirement. This sheet is provided as a service to our customers.

SDS

Safety Data Sheets (SDS) are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article". OSHA has defined "article" as a manufactured item other than a fluid or particle; (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g. minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

Because all of our batteries are defined as "articles", they are exempt from the requirements of the Hazard Communication Standard, hence a SDS is not required.

The following components are found in a Panasonic Lithium Ion battery:

Nickel Manganese Cobalt Type

Component	Material	Formula / CAS
Positive Electrode	Lithium Nickel Manganese Cobalt Oxide	LiNMnCoO ₂ 346417-97-8
Negative Electrode	Graphite	C 7440-44-0
Electrolyte	Ethylene Carbonate – Solvent	C ₃ H ₄ O ₃ 96-49-1
	Diethyl Carbonate – Solvent	C ₅ H ₁₀ O ₃ 105-58-8
	Lithium Hexafluorophosphate – Salt	LiPF ₆ 21324-40-3

Cobalt Type

Component	Material	Formula / CAS
Positive Electrode	Lithium Cobalt Oxide	LiCoO ₂ 12190-79-3
Negative Electrode	Graphite	C 7440-44-0
Electrolyte	Ethylene Carbonate – Solvent	C ₃ H ₄ O ₃ 96-49-1
	Diethyl Carbonate – Solvent	C ₅ H ₁₀ O ₃ 105-58-8
	Lithium Hexafluorophosphate – Salt	LiPF ₆ 21324-40-3

Nickel Cobalt Aluminum Type

Component	Material	Formula / CAS
Positive Electrode	Lithium Cobalt Nickel Aluminum Oxide	LiCoNiAlO ₂ 193214-24-3
Negative Electrode	Graphite	C 7440-44-0
Electrolyte	Ethylene Carbonate – Solvent	C ₃ H ₄ O ₃ 96-49-1
	Diethyl Carbonate – Solvent	C ₅ H ₁₀ O ₃ 105-58-8
	Lithium Hexafluorophosphate – Salt	LiPF ₆ 21324-40-3

Notice: The information and recommendations set forth are made in good faith and are believed to be accurate at the date of preparation. Panasonic Industrial Company makes no warranty expressed or implied.



DISPOSAL

All Panasonic Lithium ion batteries are classified by the federal government as non-hazardous waste and are safe for disposal in the normal municipal waste stream. These batteries, however, do contain recyclable materials. Panasonic is a Licensee of the Call2Recycle Battery Recycling Program. If you build our cells into a battery pack, please call 1-800-8-BATTERY or go to the Call2Recycle website at www.call2recycle.org for additional information on how your branded product can also participate in the program.

TRANSPORTATION

All Panasonic lithium ion batteries are not subject to the other requirements of the US Department of Transportation (DOT) Subchapter C, Hazardous Materials Regulations if shipped in compliance with 49 CFR 173.185.

Effective January 1, 2017 all Panasonic lithium ion batteries can be shipped by air in accordance with International Civil Aviation Organization (ICAO) 2017-2018 edition, Section II or Section 1B or International Air Transport Association (IATA), 58th edition, Section II or 1B, Packing Instructions (PI) 965 (Batteries), PI 966 (Batteries, packed with equipment) and PI 967 (Batteries, contained in equipment) as appropriate.

All Panasonic lithium ion batteries are regulated by the International Maritime Organization (IMO), 2014 edition, 37th amendment, under Special Provisions 188 and 230.

All Panasonic lithium ion cells are tested and comply with the UN Model Regulations, Manual of Test and Criteria, Part III, subsection 38.3.

If you build any of our lithium ion cells into a battery pack, you must also assure that they are tested in accordance with the UN Model Regulations, Manual of Test and Criteria. Part III, subsection 38.3, 6th revised edition.

If you plan on transporting any untested prototype battery packs contact your Panasonic Sales Representative for regulatory information. Check with your air carrier before shipping. Many air carriers have additional requirements.

FIRST AID

If you get electrolyte in your eyes, flush with water for 15 minutes without rubbing and immediately contact a physician. If you get electrolyte on your skin wash the area immediately with soap and water. If irritation continues, contact a physician. If the battery is ingested, call the National Capital Poison Center (NCPC) at 202-625-3333 (Collect) or your local poison center immediately.

GENERAL RECOMMENDATIONS

CAUTION: Risk of fire, explosion and burns. Do not short-circuit, crush, incinerate or disassemble battery.

FIRE SAFETY

In case of fire, you can use dry chemical, alcohol resistant foam or carbon dioxide fire extinguishers. Cooling the exterior of the batteries will help prevent rupturing. Fire fighters should use self-contained breathing apparatus. Detailed information on fighting a lithium ion battery fire can be found in Guide 147 (Lithium Ion Batteries) of the US DOT Emergency Response Guide.