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# MATERIAL SAFETY DATA SHEET

Reference No. 239681-0082

## LITHIUM METAL BATTERY

### 1. PRODUCT IDENTIFICATION

Product: Rechargeable? NO  
Trade name: LITHIUM/THIONYL CHLORIDE (Li-SOCl<sub>2</sub>)  
Model: ER14505M (3.6V 1.8Ah)

Electrochemical system:

Electrodes: Negative Electrode: Lithium metal (Li)  
Positive Electrode: Thionyl Chloride (SOCl<sub>2</sub>)  
Electrolyte: Lithium perchlorate  
Nominal Voltage: 3.6 Volt

### 2. COMPOSITION.

No More Than 4% Lithium Is Contained.

### 3. HAZARD DATA

3.1 Physical: The Lithium-Thionyl Chloride batteries described in this Material Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer.

Under normal conditions of use, the electrode materials and liquid electrolyte they contain are non-reactive provided the battery integrity is maintained and seals remain intact. Risk of exposure only in case of abuse, e.g. mechanical, thermal, electrical, which leads to the activation of safety valves and/or the rupture of the battery containers. Electrolyte leakage, electrode materials reaction with moisture/water of battery vent/explosion/fire may follow, depending upon circumstances.

3.2 Chemical:

**Classification of Dangerous Substances Contained into the Product as per Directive**

Substance	Chemical Symbol	Content * (%)	Melting Point °C	Indication of Danger	Special Risk	Safety Advice
Metal Lithium	Li	4	180.5	Corrosive Flammable	R14/15 R21 R22 R35 R41 R42/43	S2 S8 S45
Thionyl Chloride	SOCl <sub>2</sub>	40	-104.5	Irritant, Corrosive Harmful	R14 R22 R35 R41 R42/43	S2 S8 S24 S26 S36 S37 S45
Aluminum Chloride	AlCl <sub>3</sub>	3	190	Irritant Corrosive	R14 R22 R37 R41 R43	S2 S8 S22 S24 S26 S36

\* slight variations depending on cell type.

1. Name of Special Risks:

- R14/15 Reacts with water and yields flammable gases
- R21 Harmful in contact with skin
- R22 Harmful us swallowed
- R35 Causes severe burns
- R41 Risk of serious damage to the eye
- R42/43 May cause sensitization by inhalation and skin contact
- R43 May cause sensitization by skin contact

2. Safety Advices:

- S2 Keep out of reach from children
- S8 Keep away from moisture
- 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 attention
- S36 Wear suitable protective clothing
- S37 Wear suitable gloves
- S45 In case of incident, seek medical attention

**4. First Aid Measures**

In case of battery rupture or explosion, evacuate personnel from contaminated area and provide maximum ventilation to clear out corrosive fumes/gases and pungent odour.

In all case, seek immediate medical attention.

Eye contact: Flush with plenty of water (eyelids-held open) for at least 15 minutes.

Skin contact: Remove all contaminated clothing and flush affected areas with plenty of water and sop for at least 15 minutes.

Ingestion: Dilute by giving plenty of water and get immediate medical attention. Assure that the victim does not aspirate vomited material by use of positional drainage. Assure that mucus does not obstruct the airway. Do not give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air and ventilate the contaminated area.

## 5. Fire-Fighting Measures

Fire and explosion hazard:	The battery can spout vaporized or decomposed electrolyte fumes in case of exposure above 100oC resulting from un-appropriate use or the environment. Risk of explosion is increased if the melting point of lithium (180oC) is exceeded. Hydrogen coming from the decomposition of lithium metal with water is flammable.
Extinguishing media: Suitable:	Type D extinguishers, Lith-X Water may be used only to keep battery cool. Not to be used: Water in case of battery rupture or explosion (detectable by the pungent odour).
Special exposure hazards:	Following cell overheating due to external source or due to un-proper use, electrolyte leakage or battery container rupture may occur and release inner component/material in the environment. Eye contact: The electrolyte solution contained in the battery is corrosive to all ocular tissues. Skin contact: The electrolyte solution contained in the battery corrosive and causes skin irritation and burns. Ingestion: The ingestion of electrolyte solution causes tissue damage to throat and gastro/respiratory tract. Inhalation: Contents of a leaking or ruptured battery can cause respiratory tract, mucus, membrane irritation and edema.
Special protective equipment:	Use self-contained breathing apparatus to avoid breathing irritant fumes. Wear protective clothing and equipment to prevent body contact with electrolyte solution.

## 6. Accidental Release Measures

The material contained within the batteries would only be expelled under abusive conditions.

Using shovel or broom, cover battery or spilled substances with dry sand or, preferably, sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>) or 1:1 mixture of soda ash and slaked lime.

Keep away from water, rain, snow.

Place in approved container (after cooling if necessary) and dispose in accordance with local regulations.

## 7. Handling and Storage

The batteries should not be opened, destroyed nor incinerated since they may leak or rupture and release in the environment the ingredients they contain.

Follow Manufacturers recommendations regarding maximum recommended currents and operating temperature range. Applying pressure on deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

Handling	Do not crush, pierce, short (+) and (-) battery terminals with conductive i.e. metal, goods. Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types and brands. Do not mix new and used batteries. Keep batteries in non-conductive, i.e. plastic, trays.
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Storage	Store in ad cool (preferably below 30°C) and ventilated area away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 100°C may result in battery leakage and rupture. Since short circuit can cause burn, leakage and rupture hazard, keep batteries in original packaging until use and do not jumble them.
Other	<b>Lithium-Thionyl Chloride batteries are NOT rechargeable</b> and should not be tentatively charged.

## 8. Exposure Controls/Personal Protection

Respiratory protection:	Not necessary under normal use. In case of battery rupture, use self contained full-face respiratory equipment with type ABEK filter.
Hand protection:	Not necessary under normal use. Use Viton rubber gloves if handling a leaking or ruptured battery.
Eye protection:	Not necessary under normal use. Wear safety goggles or glasses with side shields if handling a leaking or ruptured battery.
Skin protection:	Not necessary under normal use. Use rubber apron and protective working in case of handling of a ruptured battery.

## 9. Physical And Chemical Properties

### 9.1 Appearance (Physical shape and color as supplied:)

Small metal cylinders, hermetically sealed and fitted with an external plastic sleeve.

### 9.2 Temperature range:

	Temperature range
In storage	+30°C
Max During discharge	-55~+150°C

### 9.3. Specific energy: 430Wh/Kg

### 9.4 Specific instant power: 65W/Kg

## 10. Stability and Reactivity

<b>Conditions to avoid</b>	Heat above 100°C or incinerate. Deform, mutilate, crush, pierce, disassemble, recharge. Short circuit. Prolonged exposure to humid conditions.
<b>Materials to avoid:</b>	Oxidizing agents, alkalis, water. Avoid electrolyte contact with aluminum or zinc.
<b>products:</b>	Hydrogen (H <sub>2</sub> ) as well as lithium oxide (Li <sub>2</sub> O) and lithium hydroxide (LiOH) dust is produced in case of reaction of lithium metal with water. Chlorine (Cl <sub>2</sub> ), sulfur dioxide (SO <sub>2</sub> ) and disulfur dichloride (S <sub>2</sub> Cl <sub>2</sub> ) are produced in case of thermal decomposition of thionyl chloride above 140°C. Hydrochloric acid (HCl) and sulfur dioxide (SO <sub>2</sub> ) are produced in case of reaction of thionyl chloride with water at room temperature. Hydrochloric acid (HCl) fumes, lithium oxide, (Li <sub>2</sub> O), lithium hydroxide (LiOH) and aluminum hydroxide (Al(OH) <sub>3</sub> ) dust are produced in case of reaction of lithium tetrachloroaluminate with water.

**11. Toxicological Information**

The Lithium-Thionyl chloride batteries do not contain toxic materials.

**12. Ecological Information**

When properly used or disposed, the Lithium-Thionyl chloride batteries do not present environmental hazard.

**13. Disposal Considerations.**

Dispose in accordance with applicable regulations which vary from country to country. (In most countries, the thrashing of used batteries is forbidden and the end-users are invited to dispose them properly, eventually through non profit organizations, mandated by local governments or organized on a voluntary basis by professionals).

Lithium batteries should have their terminals insulated prior to disposal.

13.1 Incineration: Incineration should never be performed by battery users but eventually by trained professionals in authorized facilities with proper gas and fumes treatment.

13.2 Landfilling: According to the proper laws and regulations in different countries or areas, the battery should be buried deeply in the specified place.

13.3 Recycling: Send to authorized recycling facilities, eventually through licensed waste carrier.

**14. Transportation**

UN number	UN3090 & UN3091
Proper shipping name	Lithium Metal batteries or, Lithium Metal batteries packed with equipment (including Lithium alloy batteries)or, Lithium Metal batteries contained in equipments (including Lithium alloy batteries).
Label(s)/Placard Required	Miscellaneous Lithium batt
Special precautions which a user needs to be aware of, or needs to comply within connection with transport or conveyance either within or outside their premises.	
ICAO/IATA:	Can be shipped by air in accordance with International Civil Aviation Organization(ICAO),TI or International Air Transport Association (IATA), DGR Packing Instructions (PI)968 Section II/Section IB, PI 969 Section II and PI 970 Section II appropriate of IATA DGR 64 <sup>th</sup> (2023)
IMDG CODE:	The batteries are not restricted to IMDG Code 2022 Edition (Amdt 41-22) according to special provision 188
DOT:	Other requirements for the US Department of Transportation (DOT) Subchapter C, Hazardous Materials Regulations if shipped in

	compliance with 49 CFR 173.185
ADR/ADN	The batteries are not subject to the provisions of United Nations Economic Commission for Europe (UNECE)ADRJADN if they meet the requirements of special provision 188 of Chapter 3.3. Applicable as from 1 January 2023.
In addition, to be permitted in transport each lithium cell and battery types must have passed the applicable tests set out in Subsection 38.3 of the UN Manual of Tests and Criteria	

**15. Regulatory Information:**

Dangerous Goods Regulations

Recommendations on the Transport of Dangerous Goods Model Regulations (22th revised edition)

Recommendations on the Transport of Dangerous Goods Manual of Tests and Criteria

International Air Transport Association(IATA)

International Maritime Dangerous Goods (IMDG Code 2022 Edition Amdt 41-22)

Technical Instructions for the Safe Transport of Dangerous Goods

Classification and code of dangerous goods(GB 6944-2012)

GB 6944-2012

2012 OSHA Hazard Communication Standard(29 CFR 1910.1200)

Toxic Substance Control Act(TSCA)

(TSCA)

Code of Federal Regulations

In accordance with all Federal, State and local laws

**16. Other Information / Disclaimer**

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable.

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**AKKU TRONICS NEW ENERGY TECHNOLOGY CO., LTD**

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