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## MATERIAL SAFETY DATA SHEET

Issued: 1/9/12

### Section 1 – IDENTIFICATION

**Product Name: 32126H150**

**DD SIZE LITHIUM /  
 THIONYL CHLORIDE CELL  
 HIGH RATE ELECTRODES**

**Hazardous Components (Approx. %)**

Lithium	3 - 4%
Thionyl Chloride	30 - 35%
Gallium Chloride (GaCl <sub>3</sub> )	5 - 7%
Lithium Chloride	1 - 2%

**Non-Hazardous Components (Approx. %)**

Stainless Steel	40 – 46%
Nickel	1 – 5%
Glass Separator	1 – 3 %
Carbon	3 – 4%
Other	3 –6%

**Lithium Content:** 8.02 grams

### Section 2 – HAZARDOUS INGREDIENTS COMPOSITION / INFORMATION

<b>Thionyl Chloride</b> CAS# 7719-09-17	<b>OSHA: None Established</b> <b>ACGIH: 1.0 ppm (5.0 mg/m<sup>3</sup>) ceiling</b>
<b>Gallium (III) Chloride</b> CAS # 13450-90-3	<b>OSHA: None Established</b> <b>ACGIH: None Established</b> <b>Exium Recommended based on AlCl<sub>3</sub>: 2 mg/m<sup>3</sup></b> <b>TLV/TWA</b>
<b>Lithium</b> CAS # 7439-93-2	<b>OSHA: None Established</b> <b>ACGIH: None Established</b>
<b>Lithium Chloride</b> CAS # 7447-41-8	<b>OSHA: None Established</b> <b>ACGIH: None Established</b>

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### Section 3 – HAZARDS IDENTIFICATION

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**Note:** The cell or battery described in this MSDS is a hermetically sealed stainless steel unit. There are no contacts or exposures from handling or using this cell or battery under normal conditions. Contact or exposure to the internal components can only occur if the cell or battery has leaked, been crushed, vented, or exploded.

**DANGER:** INTERNAL CONTENTS ARE EXTREMELY HAZARDOUS. LEAKING FLUID IS CORROSIVE. BATTERY MAY EXPLODE IF EXPOSED TO TEMPERATURES ABOVE 180 °C, EXPOSED TO FIRE, CHARGED, SHORT CIRCUITED, OR CRUSHED.

Do not expose to temperatures above 150°C due to leak hazard.

#### If cell or battery leaks or vents

**Primary Routes of Entry:** Inhalation

**Carcinogenicity:** Not listed by NTP, IARC, or regulated by OSHA.

**Health Hazards:** **Acute** – Vapors are very irritating to skin, eyes, and mucous membranes. Inhalation of large quantities of thionyl chloride may result in pulmonary edema.

**Chronic** – Overexposure can cause symptoms of non-fibrotic lung injury

**Signs and Symptoms of Exposure:** Eye and mucous membrane irritation.

**Medical Conditions Generally Aggravated by Exposure:** Asthma, other respiratory disorders, skin allergies, and eczema.

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### Section 4 – FIRST AID MEASURES

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**Eye Contact:** Flush with running water for at least 15 minutes. Hold eyelids apart. Seek immediate medical attention. Contact results in acidic burns.

**Skin Contact:** Rinse with large amounts of running water. Avoid hot water and rubbing skin. A baking soda paste applied to the contact will assist in neutralizing any acid present. If burns develop, seek medical attention. Contact results in acidic burns from decomposition products HCl and SO<sub>2</sub>.

**Inhalation:** Remove to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Inhalation of large quantities of thionyl chloride may result in pulmonary edema.

**Ingestion:** Drink copious amounts of water (or milk if available). Do not induce vomiting. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Immediately seek medical attention.

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### Section 5 – FIRE FIGHTING MEASURES

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**Flash Point:** N/A

**Auto-Ignition Temp:** N/A

**Flammable Limits:** N/A

**Danger - Do not use water**

**Extinguisher Media:** Lith-X powder, Class D fire extinguisher, Dry Lithium Chloride, Graphite Powder, Pyrene G-1.

**Special Fire Fighting Procedures:** Cover with Lith-X powder, Class D fire extinguisher, dry lithium chloride, or graphite powder.

**DO NOT USE WATER,** moist sand, CO<sub>2</sub>, Class ABC, or soda ash extinguisher. Wear protective breathing apparatus; a positive pressure Self Contained Breathing Apparatus (SCBA), or Air Purifying Respirator (APR).

**Unusual Fire and Explosion Hazards:** Do not short circuit, recharge, over discharge (discharge below 0.0 Volts), puncture, crush or expose to temperatures above 150°C. Cell may leak, vent, or explode. If a bright white flame is present, lithium content is exposed and on fire; use a Class D fire extinguisher, **Do not use water.**

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### Section 6 – ACCIDENTAL RELEASE MEASURES

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**Accidental Releases:** Do not breathe vapors or touch liquid with bare hands (see section 4). See section 8 for PPE (Personal Protective Equipment) necessary for cleaning or containing an accidental leak.

**Waste Disposal Methods:** Evacuate area. If possible, a trained person should attempt to stop or contain the leak by neutralizing spill with soda lime or baking soda. A NIOSH Approved Acid Gas Filter Mask or Self-Contained Breathing Apparatus should be worn. Seal leaking battery and soda lime or baking soda in a plastic bag and dispose of as hazardous waste.

**Other:** Follow North American Emergency Response Guide (NAERG) #138 for cells involved in an accident, cells that have vented, or have exploded.

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## Section 7 – HANDLING & STORAGE

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**Storage:** Cells should be stored at room temperature, approx. 21°C (70°F). Store cells in the original shipping containers where and when possible.

**Precautions:** Do not short circuit or expose to temperatures above 150°C. Do not recharge, over discharge, puncture or crush.

**Other Conditions:** Do not store cells in high humidity environments for long periods of time.

**Handling:** The cells and batteries are electrical storage devices. To avoid short circuiting the cell and activating the fuse, remove all metallic jewelry, watches, etc from hands or wear gloves. Only handle cells on non-conductive surfaces such as wood, plastic, etc. to avoid shorting the cell. Make sure cells are not exposed to temperatures above 150 °C from heat shrink guns, solder iron, resistance welding, etc. Contact Exium for specific handling and use concerns or questions.

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## Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

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**When handling internal components:**

**Respiratory Protection:** NIOSH Approved Acid Gas Filter Mask, or Self-Contained Breathing Apparatus.

**Protective Gloves:** Outer Gloves Nitrile 15 mil (0.015 in), or thicker Inner gloves disposable nitrile. 15 mil PVC provides limited protection. Other glove materials will decompose quickly in contact with thionyl chloride electrolyte and are not recommended.

**Eye Protection:** Chemical Worker Safety Glasses, lab goggles, or face shield.

**Ventilation To Be Used:** Negative pressure chemical fume hood.

**Other Protective Clothing & Equipment:** Protective Apron, Acid Resistant Protective Clothing, and face shield.

**Hygienic Work Practices:** Use good chemical hygiene practice. Do not eat or drink when handling contents. Avoid unnecessary contact.

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## Section 9 – PHYSICAL AND CHEMICAL PROPERTIES

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### NOT Properties of the Cell

### Properties of Internal Components

#### Thionyl Chloride

**Boiling Point:**

Thionyl Chloride: 77°C

**Vapor Pressure:**

Thionyl Chloride: 92mm @ 20 °C

**Vapor Density:**

Thionyl Chloride: 4.1

**Solubility in Water:**

Thionyl Chloride: Decomposes violently on contact with water to produce HCl and SO<sub>2</sub>.

**Specific Gravity:**

Thionyl Chloride: 1.63

**Melting Point:**

Thionyl Chloride: -105 °C

**Evaporation Rate:**

N/A

**Water Reactive:**

Thionyl Chloride hydrolyzes to form SO<sub>2</sub> and HCl gasses and strongly acidic wastewater.

**Appearance & Odor:**

Thionyl Chloride – Colorless to pale yellow; sharp, pungent chlorine type odor.

#### Lithium

**Boiling Point:**

Lithium Metal: 1336 °C. Auto Ignition in air 179°C (354.2°F)

**Vapor Pressure:**

Lithium Metal: NA at 25 °C

**Vapor Density:**

Lithium Metal: NA at 25 °C

**Solubility in Water:**

Lithium Metal: Decomposes violently on contact with water to produce flammable hydrogen gas. Lithium may also ignite as a result of water contact.

**Specific Gravity:**

Lithium Metal: 0.543 g / mL

**Melting Point:**

Lithium Metal: 180.5 °C

**Evaporation Rate:**

Lithium Metal NA at 25 °C

**Water Reactive:**

Lithium Metal Reacts with water to form hydrogen gas, caustic Lithium Hydroxide, and basic wastewater.

**Appearance & Odor:**

Lithium Metal – Soft silver – white metal. The metal turns yellow, brown, and then black upon exposure to moist air. Lithium metal has no odor.

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## Section 10 – STABILITY & REACTIVITY

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**Stability:** Stable

**Conditions to Avoid:** Temperatures in excess of 150 °C. High humidity for extended periods.

**Incompatibility:** N/A

**Hazardous Decomposition Products:** Sulfur Dioxide (g), Hydrogen Chloride (g).

**Hazardous Polymerization:** Will not occur.

**Other:** N/A

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## Section 11 – TOXICOLOGICAL INFORMATION

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**Acute Toxicity:**

**Thionyl Chloride**

**LC<sub>50</sub>** (Inhalation): 1274 ppm (rat 1-hr)

**LD<sub>50</sub>:** N/A

**Eye Effects:** Corrosive

**Skin Effects:** Corrosive

**Gallium (III) Chloride**

**LD<sub>50</sub>:** N/A

**Eye Effects:** N/A

**Other Effects:** N/A

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## Section 12 – ECOLOGICAL INFORMATION

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**Aquatic Toxicity:** Do not let internal components enter marine environments. Avoid releases into waterways, wastewater or groundwater.

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## Section 13 – DISPOSAL CONSIDERATIONS

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**Proper Shipping Name:** Waste Lithium Metal Batteries

**UN Number:** 3090

**Hazard Classification:** Class 9 (Misc.)

**Packing Group:** II

**Labels Required:** MISCELLANEOUS Hazard Class 9, HAZARDOUS WASTE

**Waste Disposal Code:** D003

**Waste Management:** Exium Cells may be managed as universal waste, confirm with your local, state, or provincial regulators.

**Other:** All lithium thionyl chloride batteries should be disposed of by a certified hazardous waste disposal facility. Contact Exium Technologies for recommended disposal facilities.

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## Section 14 – TRANSPORT INFORMATION

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**US DOT (per CFR 172.101) and IATA/ICAO**

**UN Testing Procedure:** UN Manual of Test and Criteria Chapter 38.3 Revision 4.0 – This product has been properly tested to ensure product is safe for all means of transport.

**Proper Shipping Name Per IATA:** Lithium Metal Batteries.

(Note some carriers use the DOT “Lithium Batteries” consult with your carrier if the proper shipping name is in question)

**UN Number:** UN 3090

**Hazard Classification:** Class 9 (Misc.) – See IATA 7.4.8 label specifications

**Packing Group:** II

Packing Instructions: IATA 968, 969, and 970 - To ensure safe transport, it is highly recommended all personnel involved with the packaging, marking, labeling and shipping of this material review these specific packaging procedures to reduce the possibility for an incident to occur while product is in transport. The repercussions of a Lithium Battery incident while in transport could be severe.

**Labels Required:** MISCELLANEOUS HAZARD CLASS 9 with tab to indicate proper shipping name and UN number.

**Other Label Requirements:**

- CARGO AIRCRAFT ONLY – This label is required if operator or state regulations specify quantity of material exceeds or is deemed unacceptable for transport via passenger aircraft
- Primary Lithium Batteries – As required by the US DOT, an addition label using the design specifications listed in CFR 49 Part 173.185.b.5 must be applied to each shipping container to identify product as Primary Lithium Batteries.
- Caution Label – As required by IATA regulations, a caution label MUST be applied to each package identifying the enclosed product (Lithium Batteries) and the special procedure to be followed in the event that the package is damaged

**Emergency Services:** All shipments of hazardous materials MUST include a 24/7 contact number for use in the event of an emergency.

**Hazardous Materials Transport Instructional Materials:**

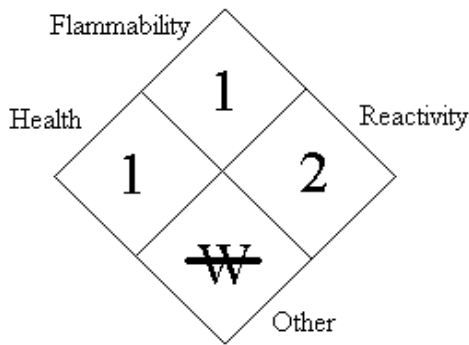
- All personal which will package, label, mark and ship hazardous materials MUST be correctly trained with the below material in order to legally and safety transport hazardous materials.
  1. IATA Dangerous Goods Regulations – Most recent edition available. This document will provide the clearest understanding of handling hazardous materials shipping procedures, and is a MUST if your company will transport hazardous material via AIR.
  2. USDOT CFR 49 Parts 100 – 185 – covers all methods of hazardous material transport with the USA.
  3. Additional research may be required due to specific procedures required by individual operators (carriers) and states (Countries).

**Section 15 – REGULATORY INFORMATION**

**OSHA Status:** The internal component (thionyl chloride) is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1920.1200.

**Section 16 – OTHER INFORMATION**

**NFPA RATING**



For cells or battery packs involved in an accident, cells that have vented, or exploded, follow the North American Emergency Response Guide (NAERG) #138.

Prepared by: Sean Riley  
 Date: 9/17/10  
 Updated 1/9/12 Sean Riley