



A Basic Safe Handling Guide for Lithium Hypochlorite

Disclaimer

In preparing this guide, FMC Lithium has utilized the best information known and available at the time of printing. FMC Lithium recognizes that over time techniques, methods and equipment related to the safe handling of lithium metal will evolve, dating the information within this guide.

Additionally, the information presented in this Guide has been written to address most typical situations, environments and facilities, based upon FMC Lithium's experiences. However, FMC Lithium recognizes that each customer's situation is different and necessitates specific solutions to fit those requirements. This guide is intended to assist in the handling of small quantities of SLMP[®] in a laboratory environment.

FMC Lithium seeks to provide up-to-date solutions to the questions or concerns that our customers may have. Please contact us to discuss your specific needs.

Responsible Care

FMC supports the principles of the American Chemistry Council (ACC) Responsible Care[®] program by working with our employees, suppliers, customers, contractors, and commercial partners to promote responsible management of products and processes.



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Physical Properties

| | | |
|--------------------|--|------|
| Appearance | Free-flowing white granules | |
| Available chloride | 36.8 typical 35.0 minimum 39.0 maximum | |
| Bulk Density | 0.98 g/cm ³ | |
| Particle size | 100 mesh less than 1% | |
| Solubility Rate | 250 ppm available chloride in water 30 sec at 75°F 15 sec at 100°F | |
| Available Chloride | ppm | pH |
| | 100 | 9.9 |
| | 200 | 10.3 |
| | 400 | 10.7 |



Lithium Hypochlorite

Transport classification

- Oxidizing solid, N. O. S.
- Class 5.1, Oxidizer, Packing group: III

Storage - NFPA class 1

Typical Shipping containers

- 50 lb Net packaged in plastic polyethylene pails
- 100 lb Net packaged in polyethylene-lined fiber drums
- 100 lb Net packaged in plastic polyethylene pails
- 400 lb Net packaged in polyethylene-lined fiber drums
- 2,000 lb Net packaged in polyethylene-lined supersacks EPA

Biocide registration:

- Sold for pool/spa repack
- Hard surface sanitization



Physical Hazards

- Oxidizer, supports combustion of other materials by producing oxygen.
- Can decompose if too hot, releasing heat and oxygen.
- Other hazardous decomposition products are lithium hydroxide, lithium chlorates.
- Contamination with combustible organic materials can cause a serious fire or explosion hazard.
- Incompatible materials – Acids, oxidizable materials, combustible materials
- Does not polymerize



Stability

- Lithium hypochlorite has excellent stability during storage when properly packaged to protect it from moisture and carbon dioxide.
- A loss of about 0.2% available chlorine can be expected under normal storage conditions. Loss decreases with decreasing package sizes.

Health Hazards

- Extremely irritating to eyes, skin, nose and throat.
- Inhalation can cause coughing and difficulty breathing
 - Exposure limits for PNOC (Particulates Not Otherwise Classified)
 - Inhalable particulate 10 mg/m³
 - Respirable particulate 3 mg/m³
- Does not meet criteria for Corrosive transport class
- However, can become corrosive when handled, especially if dusting in air.
- In a fire, hypochlorites can release toxic chlorine gas

Toxicological Information

| | |
|--|--|
| Eye Contact | Severely irritating (rabbit) |
| Skin Contact | Non-corrosive (Corrositex in0vitro) |
| Skin Absorption | Dermal LD ₅₀ 8, 100 mg/kg (rabbit) |
| Ingestion | Oral LD ₅₀ 555 mg/kg (rat) |
| Inhalation | Inhalation LC ₂₀ 2.0 mg/L (rat) |
| Acute Effects | Severely irritating/corrosive to the eyes, skin, respiratory track, and mucous membranes |
| Chronic Effects | Continuous inhalation exposure may cause lung damage |
| Sensitization | Non-sensitizing (guinea pig) |
| Carcinogenicity | Not considered a carcinogen under OSHA |
| Mutagenicity/ Reproductive Toxicity | Not mutagenic or genotoxic |

Environmental Hazards

- Hypochlorites are highly toxic to fish and marine life and slightly toxic to birds or other animals
 - Mallard Duck:
 - Acute Oral $LD_{50} = 1,960$ mg/kg,
 - 5 day dietary $LC_{50} > 17,240$ ppm (no deaths at max dose)
 - Bobwhite Quail: 5 day dietary $LC_{50} > 17,240$ ppm
 - Rainbow Trout: 96 hour $LC_{50} = 0.96$ mg/L
 - Bluegill: 96 hour $LC_{50} = 0.97$ mg/L
 - Daphnia: 48 hour $LC_{50} = 0.37$ μ g/L
- Discharge to lakes or streams must be under NPDES permit

Handling

- Avoid contamination with incompatible materials
- Water
 - Large amounts needed for firefighting, spill clean up
 - Small amounts cause instability
- Product should be kept very dry until used or disposed of
- 2 year shelf life
- Avoid spills
- Do not store opened containers



Personal Protective Equipment

Eyes and Face:

- Safety glasses or goggles



Respiratory:

- When adequate ventilation is not available, wear a NIOSH/MSHA respirator approved for protection against inorganic and hypochlorite dust.

Protective Clothing:

- Rubber gloves



Work Hygienic Practices:

- Quick-drench eyewash and safety shower

Storage

- NFPA 430 specifies limits for Class 1 oxidizers
- Supersacks – sprinklered area
 - 200K lbs pile limit
 - 12 ft max pile height, 24 ft max width
 - Aisle - one pile height separation from next pile
 - 8 ft or more away from incompatible material
- Segregation from incompatible materials (solvents)
 - by distance in NFPA 430
 - by partitions or walls
 - separate buildings
 - 25 feet with dikes, drains or floor slopes to prevent flammable liquids from encroaching



Storage (continued)

- Storage of more than 300,000 pounds of material requires use of a dispersion model to determine the effects of dangerous decomposition oxygen concentrations upon the surrounding area. If the dispersion modeling results indicate a concern, then additional means, such as a higher sprinkler density or smaller isolated product piles, must be utilized to mitigate or prevent the concern.
- Emergency plans must be developed for each facility. These plans should be reviewed and training exercises be conducted, at least annually, in conjunction with local authorities if possible.



Storage (continued)

- Facility design must take into account:
 - containment to protect the environment, local community and personnel from lithium hypochlorite, fire, water and decomposition products.
 - all appropriate federal, state and local codes, standards and regulations.
- Personnel involved in operations where lithium hypochlorite is stored must receive training on:
 - proper handling
 - proper disposal of spilled material
 - preventing contamination with water, organics, metals, reducing agents or other incompatible materials
- Storage areas must be conspicuously marked with signs indicating:
 - Class 1 Oxidizer
 - No smoking



Transferring, Repackaging, Blending, Processing or Mixing material

- Process Hazards Review on product use is required.
- Compatible materials of construction for equipment in contact with product, or a diluted or dissolved mixture.
- Contamination sources:
 - Need to be identified
 - Protected against
- Imparting mechanical energy on the product increases the risk of decomposition by frictional heat generation.
- Lithium hypochlorite dust:
 - Can be irritating to the eyes, nose, lungs, throat and skin.
 - Exposure to lithium hypochlorite dust may cause breathing difficulty in sensitive persons.
 - Dust collection systems provided must be in accordance with NFPA 9.

Transportation

- Transport packaging:
 - Supersaks: UN certified type 13H
 - Drums: UN certified type 4G
- Packing group II level of certification
- Truck Transportation:
 - Bracing is required in transit.
- Bulk shipments of Lithium Hypochlorite:
 - Must be shipped in refrigerated vans if the ambient temperature at which the load is traveling is at or above 115 degrees F.
 - The temperature inside a trailer may reach significantly higher temperatures than ambient during transit if not refrigerated.
 - The temperature inside these refrigerated containers should be maintained at 70-75 degrees F.
- This requirement does not apply to material packaged in 100 Lb drum quantities.



First Aid Measures

| | |
|--------------------------|--|
| <p>Eyes</p> | <p>Immediately flush with water for a minimum of 15 minutes. See medical doctor or ophthalmologist immediately.</p> |
| <p>Skin</p> | <p>Immediately flush with plenty of water. Remove contaminated clothing, wash with soap and water.</p> |
| <p>Ingestion</p> | <p>Rinse mouth with water. Dilute by giving 1-2 glasses of water. Do not induce vomiting. See a medical doctor immediately.</p> |
| <p>Inhalation</p> | <p>Remove to fresh air. If breathing difficulty occurs and persists, see a medical doctor. If breathing has stopped give artificial respiration.</p> |

Firefighting

- Only water should be used to fight fires. Do not use dry chemical, CO₂ or Halon
- Adequate water must be ensured through:
 - Hydrants – NFPA and local authorities
 - Water flow >750 GPM streams >500 GPM sprinkler
 - Duration – 2 hours
- Water based fire systems must be inspected, tested, and maintained in accordance with NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
- Manual fire-fighting equipment in the form of portable water extinguishers or water hose reel stations provided in accordance with NFPA requirements



Phone Numbers

FMC Lithium Headquarters

Charlotte, NC US + 1 704 426 5300

(toll free in US 1-888-Lithium)

Emergency

North America

Transportation: CHEMTREC 800 424-9300

Other Emergency: FMC 704 629-5361 (call collect 24 hrs/day)

Europe

Specialist advice number +44 (0) 1865-407333

