

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION	
ROCKWOOD LITHIUM 348 HOLIDAY INN DRIVE KINGS MOUNTAIN, NC 28086 704-739-2501 (8 AM-5 PM M-Th) (8 AM- 12 PM F)	FOR EMERGENCY TRANSPORTATION INFORMATION, CALL CHEMTREC 1-800-424-9300
SUBSTANCE: LITHIUM FLUORIDE TRADE NAMES/SYNONYMS: None. CHEMICAL FAMILY: Inorganic Salt PRODUCT USE: Used for a variety of industrial and research applications. FORMULA: LiF	

SECTION 2 HAZARDS IDENTIFICATION		
GHS Classification:		
Health	Environmental	Physical
Eye Irritation- Category 2A Acute Toxicity (Oral) – Category 4	None	None
Lithium Fluoride WARNING!		
H302 Harmful if swallowed. H319 Causes serious eye irritation. Prevention: P264 Wash hands thoroughly after handling. P270 Do not eat, drink or smoke while using this product. P280 Wear suitable protective clothing, gloves and eye/face protection. Response: P301+P312 IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell. P330 Rinse mouth.		P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337+P313 If eye irritation persists: Get medical advice. Disposal P501 Dispose of contents and container to an approved waste disposal plant.

SECTION 3 COMPOSITION, INFORMATION ON INGREDIENTS		
Component	CAS #	% w/w
Lithium Fluoride	7789-24-4	100
NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-2004 format.		

SECTION 4 FIRST-AID MEASURES
Victims of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention if necessary. Take copy of label and MSDS to physician or health professional with victim. <u>SKIN EXPOSURE:</u> Immediately begin decontamination with running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victims must seek immediate medical attention if adverse effect occurs. <u>EYE EXPOSURE:</u> Immediately flush victim's eyes with gently running water, holding open eyelids. Have victim "roll" eyes. <u>Minimum</u> flushing is for 15 minutes. Victims must seek immediate medical attention if any adverse effect occurs. <u>INHALATION:</u> Remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers. Seek medical attention if adverse effect continues after removal to fresh air. <u>INGESTION:</u> If swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING unless directed by medical personnel. If conscious, have victim rinse mouth with water. Never induce vomiting or give diluents (milk or water) to someone who is <u>unconscious, having</u>

SECTION 4 FIRST-AID MEASURES

convulsions, or unable to swallow.

MOST IMPORTANT SYMPTOMS/EFFECTS, ACUTE AND DELAYED: Irritation of eyes. Ingestion of Lithium Fluoride may cause salivation, nausea, abdominal pain, and labored breathing, rash, ringing in the ears, nausea, vomiting, diarrhea, difficulty speaking, drowsiness, twitching, visual disturbances, and coma. Chronic ingestion or inhalation of Lithium Fluoride may cause fluorosis (chronic fluoride poisoning) and lithium poisoning with kidney and central nervous system effects.

INDICATION OF IMMEDIATE MEDICAL TREATMENT AND SPECIAL TREATMENT: Immediate medical attention is recommended for ingestion.

SECTION 5 FIRE-FIGHTING MEASURES

FIRE EXTINGUISHING MEDIA: Lithium Fluoride is not combustible. Use fire extinguishing material appropriate for surrounding fires.

SPECIFIC FIRE AND EXPLOSION HAZARDS: Lithium Fluoride presents a moderate contact hazard to firefighters. When involved in a fire, Lithium Fluoride may decompose and produce irritating fumes and toxic gases (lithium compounds, hydrogen fluoride).

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING EQUIPMENT AND PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, firefighters should control runoff water to prevent environmental contamination.

SECTION 6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people. The minimum Personal Protective Equipment recommended for response to non-incident releases should be Level C: nitrile gloves, chemical resistant suit and boots, hard-hat, and air-purifying respirator with high-efficiency particulate filter.

METHODS AND MATERIALS FOR CONTAINMENT/CLEANUP: Sweep up or vacuum spilled Lithium Fluoride carefully, avoiding the generation of dusts. Decontaminate the area thoroughly. Place all spill residue in a suitable container and seal. Dispose of in accordance with U.S. Federal, State, and local or Canadian solid waste disposal regulations (see Section 13, Disposal Considerations).

SECTION 7 HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING: Avoid contact with eyes, skin and clothing. Avoid breathing dust. Wash thoroughly after handling Lithium Fluoride. Do not eat, drink, or smoke while handling this product. Remove contaminated clothing immediately. Use ventilation and other engineering controls to minimize potential exposure to Lithium Fluoride. All employees who handle Lithium Fluoride should be trained to handle it safely. Ensure containers of Lithium Fluoride are properly labeled. Open containers slowly on a stable surface. Read instructions provided with the product prior to use. Empty containers may contain residual material; therefore, empty containers must be handled with care.

STORAGE: Storage area of Lithium Fluoride should be clearly identified, well illuminated, clear of obstruction, and accessible only to trained and authorized personnel. Store containers in a cool, dry location, away from direct sunlight, or sources of intense heat. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Keep container tightly closed when not in use. Storage areas should be made of fire resistant materials. Post warning signs in storage and use areas, as appropriate. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION					
Component	Exposure Limits in Air				
	ACGIH-TLVs		OSHA-PELs		OTHER
	TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	mg/m ³
Lithium Fluoride (as fluorides)	2.5	NE	2.5	NE	NIOSH REL: TWA = 2.5 DFG MAKs: TWA = 1 inhalable skin PEAK = 2 MAK, 15 min. average value, 1 hour interval
NE = Not Established See Section 16 for Definition of other terms and acronyms used.					
<p><u>The information presented is based only on Lithium Fluoride. The Exposure Controls and Personal Protection required will be dependent on the conditions present in the workplace, including the presence of other chemicals. PPE should be based on a Hazard Assessment as required in 29CFR1910.132.</u></p> <p><u>VENTILATION AND ENGINEERING CONTROLS:</u> Use with adequate ventilation, to ensure exposure levels are minimized. Mechanical exhaust may be needed.</p> <p><u>RESPIRATORY PROTECTION:</u> If ventilation is inadequate, an approved dust respirator may be required. For higher exposures or in potentially oxygen deficient atmospheres, a supplied air respirator may be required. Respirator selection and use should be based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2, CSA Standard Z94.4-02 and good Industrial Hygiene practice.</p> <p><u>EYE PROTECTION:</u> Splash goggles or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, and appropriate Canadian Standards.</p> <p><u>HAND PROTECTION:</u> Wear neoprene or nitrile gloves for routine industrial use. If necessary, refer to U.S. OSHA 29 CFR 1910.138 and appropriate Standards of Canada.</p> <p><u>BODY PROTECTION:</u> Use body protection appropriate for task (e.g., Apron or Body suit). If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, wear foot protection, as described in U.S. OSHA 29 CFR 1910.136.</p> <p>Where there is any possibility that an employee's eyes may be exposed to Lithium Fluoride, the employer should provide an eye wash fountain within the immediate work area for emergency use.</p>					

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES	
<p><u>APPEARANCE:</u> White powder.</p> <p><u>ODOR:</u> None</p> <p><u>ODOR THRESHOLD:</u> Not applicable.</p> <p><u>pH:</u> Not applicable</p> <p><u>MELTING/FREEZING POINT:</u> 870°C (1598°F)</p> <p><u>BOILING POINT:</u> 1681°C (3058°F)</p> <p><u>FLASH POINT:</u> Not applicable</p> <p><u>EVAPORATION RATE:</u> Not applicable</p> <p><u>FLAMMABILITY:</u> Not flammable</p>	<p><u>FLAMMABLE LIMITS (in air by volume):</u> Not applicable</p> <p><u>VAPOR PRESSURE, mm Hg @ 20°C:</u> Not applicable.</p> <p><u>VAPOR DENSITY (air = 1):</u> Not applicable.</p> <p><u>SPECIFIC GRAVITY (water = 1):</u> 2.6</p> <p><u>SOLUBILITY IN WATER @ 20°C:</u> 2.9g/L</p> <p><u>COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT):</u> Not established</p> <p><u>AUTOIGNITION TEMPERATURE:</u> Not applicable.</p> <p><u>DECOMPOSITION TEMPERATURE:</u> Not applicable</p> <p><u>VISCOSITY:</u> Not applicable</p>

SECTION 10 STABILITY AND REACTIVITY
<p><u>REACTIVITY:</u> Not reactive under normal conditions.</p> <p><u>STABILITY:</u> Stable.</p> <p><u>POSSIBILITY OF HAZARDOUS REACTIONS:</u> May react with strong acids to generate toxic and corrosive hydrofluoric acid and strong oxidizers to generate heat.</p> <p><u>CONDITIONS TO AVOID:</u> None known</p> <p><u>INCOMPATIBLE MATERIALS:</u> Lithium Fluoride is not compatible with strong acids and strong oxidizers. Keep away from glass.</p> <p><u>HAZARDOUS DECOMPOSITION PRODUCTS:</u> Thermal decomposition of Lithium Fluoride includes hydrogen fluoride and lithium compounds. Reaction with strong acids generates toxic and corrosive hydrofluoric acid.</p>

SECTION 11 TOXICOLOGICAL INFORMATION
<p><u>SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:</u> The most serious health consequence reported for Lithium Fluoride is adverse effects on the bones, central nervous system and kidneys. In terms of anticipated occupational overexposure situations for employees, the main health effect from overexposure would be irritation of</p>

SECTION 11 TOXICOLOGICAL INFORMATION

contaminated eyes.

INHALATION: Inhalation of Lithium Fluoride powder can moderately to severely irritate the upper respiratory system. Symptoms of inhalation overexposure include sneezing, coughing, nasal congestion, and sore throat. Inhalation of large doses or chronic inhalation of Lithium Fluoride can produce symptoms described for "Ingestion". Because of the presence of the fluoride ion in this compound, prolonged or repeated inhalation overexposures can result in a perforated nasal septum. Overexposure to fluoride compounds may cause or aggravate asthma attacks and may cause pulmonary fibrosis.

CONTACT WITH SKIN or EYES: Lithium Fluoride may cause skin irritation in some individuals. Overexposure of the skin can lead to itching, pain, and reddening. Prolonged or repeated skin exposures can lead to dermatitis (dry, red skin). Lithium Fluoride causes eye irritation; symptoms of such overexposure would be pain and reddening of the eye tissue.

SKIN ABSORPTION: Skin absorption is not a significant route of exposure for Lithium Fluoride.

INGESTION: Ingestion is not anticipated to be a significant route of occupational exposure. If Lithium Fluoride is swallowed (especially in large doses), it can cause serious health effects. Large doses of lithium compounds can cause drowsiness, tremors, dizziness, prostration, diarrhea, and kidney damage (especially if sodium intake is limited). Fluoride compounds can cause salivation, nausea, vomiting, abdominal pain, fever, and labored breathing. There are reports that soluble fluorides, similar to Lithium Fluoride, can be fatal to humans in a single dose of 71 mg/kg (approximately 4,800 mg for an average adult). Chronic ingestion of Lithium Fluoride may cause fluorosis (chronic fluoride poisoning). Symptoms can include calcification of the bones, ligaments, and tendons (making normal movements painful), anorexia, anemia, emaciation, and mottled teeth.

CHRONIC: Prolonged or repeated skin exposures can lead to dermatitis. Prolonged or repeated inhalation overexposures can result in a perforated nasal septum. Overexposure to fluoride compounds may cause or aggravate asthma attacks and other lung disorders. Chronic ingestion or inhalation of Lithium Fluoride may cause fluorosis (chronic fluoride poisoning) and lithium poisoning with kidney and central nervous system effects.

TARGET ORGANS: ACUTE: Eyes, skin, central nervous system, kidneys. CHRONIC: Skin, lungs, central nervous system, kidneys, bones.

TOXICITY DATA: The following toxicology data are currently available for Lithium Fluoride.

LD₅₀ (Oral-Rat) 608 mg/kg

CARCINOGENICITY STATUS: Lithium Fluoride is not listed as a carcinogen or suspected carcinogen by IARC, NTP, OSHA or ACGIH.

IRRITANCY OF PRODUCT: Lithium Fluoride can moderately to severely irritate the eyes and may cause skin irritation.

SENSITIZATION TO THE PRODUCT: Lithium Fluoride is not known to be a skin or respiratory sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Lithium Fluoride on the human reproductive system. Lithium Chloride and Lithium carbonate have led to reproductive effects in laboratory experiments; Reproductive effects were also observed with humans, as well as effects on the infants through breast feeding. The validity of animal test and its significance for humans cannot be concluded with certainty.

Mutagenicity: Lithium Fluoride is not reported to produce mutagenic effects in humans or animals.

Embryotoxicity: Lithium Fluoride is not reported to produce embryotoxic effects in humans or animals.

Teratogenicity: Lithium Fluoride is not reported to produce teratogenic effects in humans or animals.

Reproductive Toxicity: Lithium Fluoride is not reported to produce adverse reproductive effects in humans or animals.

ACGIH BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, there are ACGIH Biological Exposure Indices (BEIs) associated with Lithium Fluoride as a Fluoride compound.

<u>CHEMICAL DETERMINANT</u>	<u>SAMPLING TIME</u>	<u>BEI</u>
FLUORIDES • Fluorides in urine	• Prior to shift • End of shift	• 3 mg/g creatinine • 10 mg/g creatinine

SECTION 12 ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: Lithium Fluoride is stable in the environment.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: The effects on exposed animals would be primarily irritation of contaminated tissue. The main effect on plants would be the increase in salinity of contaminated soils if large volumes of

SECTION 12 ECOLOGICAL INFORMATION

Lithium Fluoride are released.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Releases of large quantities of Lithium Fluoride can be detrimental to an aquatic environment, by altering the salinity of a body of water.

ACUTE AQUATIC TOXICITY: The following aquatic toxicity data are available for Lithium Ion:

LC₅₀ Pimephales promelas (fathead minnow) 1.4 mg/L/96 hr (OECD 210)

DEGRADABILITY: The methods for determining biodegradability are not applicable to inorganic substances.

LOG BIOCONCENTRATION FACTOR (BCF): No data available.

LOG OCTANOL/WATER PARTITION COEFFICIENT: No data available

SECTION 13 DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada and its Provinces. Lithium Fluoride, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local solid waste regulatory authority.

U.S. EPA WASTE NUMBER: Not applicable to wastes consisting only of Lithium Fluoride.

SECTION 14 TRANSPORT INFORMATION

THIS COMPOUND IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

NORTH AMERICAN EMERGENCY RESPONSE GUIDE NUMBER (2012): Not Applicable

MARINE POLLUTANT: No component of this product is designated as a Marine Pollutant by the DOT (per 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This compound is not considered as dangerous goods, per regulations of Transport Canada.

EMERGENCY RESPONSE CONTACT FOR AN INCIDENT DURING TRANSPORTATION:

CHEMTREC 1-800-424-9300 or 1-703-527-3887

SECTION 15 REGULATORY INFORMATION

U.S. SARA REPORTING REQUIREMENTS: Lithium Fluoride is not subject to the reporting requirements of the Comprehensive Environmental Response, Compensation, and Liability Act and Sections 302 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

CERCLA SECTION 103 (40 CFR 302.4) Listed CERCLA Hazardous Substance: No

SARA SECTION 302 (40 CFR 355.30) Extremely Hazardous Substance: No

SARA SECTION 304 (40 CFR 355.40) RQ-CERCLA or SARA 302: No

SARA SECTION 313 (40 CFR 372.65): Toxic Chemical Release Inventory (TRI/Form R): No

U.S. SARA SECTION 311/312 HAZARD CATEGORIES: Acute Health, Chronic Health

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: Lithium Fluoride is listed on the TSCA Inventory.

U.S. TSCA 12(b) EXPORT NOTIFICATION: TSCA 12(b) Notification is not required, per 40 CFR 707, for Lithium Fluoride.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

U.S. STATE REGULATORY INFORMATION: The components of this product are covered under specific State regulations, as denoted below:

Massachusetts - Substance List: No.

New Jersey - Right to Know Hazardous Substance List: No.

Michigan - Critical Materials Register: Lithium Compounds.

Pennsylvania - Hazardous Substance List: No.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Lithium Fluoride is not on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDL INVENTORY STATUS: Lithium Fluoride is on the DSL.

CANADIAN WHMIS SYMBOLS: **Class D2B** Other Toxic Effects -Chronic Toxicity, Eye Irritation

This MSDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

SECTION 16**OTHER INFORMATION**

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM RATING: Health Hazard = 2; Fire Hazard = 0; Physical Hazard = 0

NFPA RATING: Health Hazard = 2; Fire Hazard = 0; Instability Hazard = 0

4 = Severe Hazard 3 = Serious Hazard 2 = Moderate Hazard 1 = Slight Hazard 0 = Minimal Hazard

CREATION DATE: February 18, 1997

REVISION DATE: July 8, 2012

REVISIONS 2012- Added GHS Classification and Labeling, Formatting changes to comply with OSHA Hazcom 2012, additional changes to sections 2, 4, 10, 11, and 12.

DEFINITIONS OF EXPOSURE LIMIT TERMS AND ABBREVIATIONS

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association that establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration. **PEL** - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based on the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called **Recommended Exposure Levels (RELs)**. When no exposure guidelines are established, an entry of **NE** is made for reference.

DNEL(Derived No-Effect Level): A DNEL is the level of exposure to the substance below which no adverse effects are expected to occur. It is therefore the level of exposure to the substance above which humans should not be exposed. DNEL is a derived level of exposure because it is normally calculated on the basis of available dose descriptors from animal studies such as No Observed Adverse Effect Levels (NOAELs) or benchmark doses (BMDs). This value is derived under EU REACH when a chemical safety assessment is performed as part of registration.

PNEC (Predicted No-Effect Concentration): Concentration of the substance below which adverse effects in the environmental sphere of concern are not expected to occur. This value is derived under EU REACH when a chemical safety assessment is performed as part of registration.

The information in this Safety Data Sheet is based on data that Rockwood Lithium believes to be reliable as of the SDSs date of revision. Rockwood Lithium makes no warranty or representation of any kind that the SDS does not contain errors. The data in this SDS relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside the control of Rockwood Lithium, there are no warranties, expressed or implied, and Rockwood Lithium assumes no liability in connection with the use of this information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe on any patents. Any use of these data and information must be determined by the user to be in accordance with Federal, State and local laws and regulations.



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