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## School Materials Safety Manual:

No. 230 Lithium Fluoride  
Issued 5/90

### ♦ SECTION 1 INTRODUCTION

**Material** Lithium Fluoride, ca 99% (73.25% fluoride by weight)

**Chemical Formula** LiF

**CAS Number** 7789-24-4

**DOT Classification** Not listed as a Hazardous Material for Transportation (49 CFR 172.101)

**EPA Classification** Not listed as a RCRA Hazardous Waste (40 CFR 261.33), a CERCLA Hazardous Substance (40 CFR 302.4), a SARA Extremely Hazardous Substance (40 CFR 355), or a SARA Toxic Chemical (40 CFR 372.65)

**OSHA Classification** Not listed as an Air Contaminant (29 CFR 1910.1000, Subpart Z)

**NFPA Hazard Rating** Not found

**Genium Hazard Rating**

4 = Extreme

3 = High

2 = Moderate

1 = Slight

0 = Minimum



**Description** Lithium fluoride occurs as a white, fluffy powder or cubic crystals with a structure similar to sodium chloride (table salt).

**Overview** This toxic material is strongly irritating to eyes and skin. It is considered an inhalation and skin contact hazard. LiF has uses as a soldering and welding flux (for aluminum), in heat exchange media, and for prisms in certain electronic instruments. It may also be used as a reagent in a school chemistry lab. Staff members using materials containing this chemical should follow all precautions listed on the package label and MSDS, especially with regard to ventilation and personal protective equipment.

**Manufacturer** Always request an up-to-date MSDS from your chemical supplier. That sheet should identify the substance's manufacturer and include an emergency phone number. This *Manual's* Resources/Manufacturers Index lists some larger manufacturers and available emergency phone numbers.

### ♦ SECTION 2 USE AND STORAGE DATA

**Preliminary Planning Considerations** Plan and provide for safe disposal of all school-generated chemical waste. Check applicable regulations prior to use. Restrict use to fume hood to avoid exceeding the TLV (Sec. 4). For safety, do not wear contact lenses in the lab: soft lenses may absorb, and all lenses concentrate, irritants. Particles adhering to contact lens surfaces can cause corneal damage. Rubber gloves are recommended to minimize skin contact. Employees and students should know the location of eyewash and shower facilities near where chemicals are used. Be sure that eyewash stations and safety showers are in good working order. Review Sec. 4 and 5 for the specific health hazards and first aid procedures associated with exposure to LiF and the fluoride anion. Obtain Zephrian chloride solution for potential first aid needs. Become familiar with the specific detailed protocols developed for burns and significant exposures.

**Usage Precautions and Procedure** Before using, read this material's container label and follow all precautions. Do not let LiF contact eyes, skin, or clothing. Avoid inhaling its dust or solution mist. Do not taste or swallow this substance. Do not smoke in storage or use areas. Keep LiF away from acids. Practice good housekeeping to avoid unintentionally mixing incompatibles. Do not allow chemical residue or dust buildup in lab or work areas. Clean up spilled material promptly and thoroughly. Wear safety glasses or goggles and appropriate protective clothing to work with this substance. Keep this material away from notebooks, textbooks, and personal belongings to avoid contamination and transporting chemical residues from the lab/work area. After working with chemical materials, and before eating, drinking, or smoking, always wash hands and face. Remove and launder contaminated clothing before reusing.

**Additional Data** Lithium fluoride is stable at room temperature under normal handling and storage conditions. It does not polymerize. Its incompatibilities include strong acids. Highly dangerous hydrogen fluoride (HF) gas may be produced by contact with strong acids at elevated temperature.

**Preferred Storage Location and Methods** Storage areas should be cool and well ventilated, and the containers tightly closed and out of direct sunlight. To separate incompatible chemicals, store by chemical family, not by alphabetical name, on sturdy shelving away from acids. Storing primary containers inside heavy-duty plastic bags or other containers may be advisable. Protect all chemical containers from physical damage. Prohibit any smoking in chemical storage areas. Purchase amounts equal to only a year's needs, if at all.

### ♦ SECTION 3 SPILL/DISPOSAL PROCEDURES

**If Spilled** Prevent spilled LiF from contacting strong acids. Ventilate spill area. Cleanup personnel should protect against skin or eye contact and dust or vapor inhalation. Clean up spilled material promptly and thoroughly. Cover liquid (solution) spill with an inert, solid absorbent (vermiculite, dry sand, etc.) and scoop into appropriate disposal containers (with a secure lid) in accordance with existing regulations. Carefully collect and scoop spilled dry material into a secure disposal or reclamation container. Avoid creating airborne dust conditions. Sweep, vacuum (with an appropriate filter), or wet mop to minimize dust dispersion.

**Disposal of Small Quantities** Handle emptied containers carefully since residues may remain. Investigate recycling, reclamation, or destruction to a less hazardous material rather than disposal of untreated waste to a landfill. Follow all applicable regulations for disposal of LiF or its by-products. Check regulations before disposal is necessary. If the method described above is not practical, feasible, or in accord with existing regulations, contact your supplier or a licensed disposal contractor for specific treatment/disposal procedures.

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**Disposal of Larger Amounts** Contact your supplier or a licensed disposal company.

**Follow all applicable local, state, and Federal regulations for all waste disposal.**

#### ◆ SECTION 4 HEALTH HAZARDS

**Summary** LiF's low water solubility limits its acute toxic effects. Chronic exposure through inhalation or ingestion of large quantities can cause illness from either lithium or fluoride toxicity. Common signs of lithium toxicity include lethargy, fatigue, muscle weakness, tremors, headache, memory impairment and other central nervous system effects, nausea, anorexia, epigastric bloating, diarrhea, vomiting, abdominal pain, diabetes insipidus which causes frequent urination and increased thirst, and some kidney damage. Other organs less commonly affected by lithium include the thyroid gland, the heart, the skin, and the eyes. Acute fluoride intoxication is manifested by hypersalivation, a salty or soapy taste, epigastric pain, nausea, vomiting, diarrhea, dehydration, hives, weakness, tremors, and rarely seizures. Chronic exposure may cause increased bone density, with pain in the joints (fluorosis). Direct contact with lithium fluoride dust or solution may cause skin and eye irritation. The potential for the formation of hydrofluoric acid exists, especially if poor technique and hygiene allow for mixing with acid compounds. Hydrofluoric acid burns may not produce immediate pain or visible damage, but the fluoride ion penetrates deeper into tissues and cause destruction whose effects become evident later.

**1989-90 ACGIH TLV and 1989 OSHA PEL** 8-hr TWA: 2.5 mg/m<sup>3</sup> (for fluorides as F)

**1988 NIOSH REL** 10-hr TWA: 2.5 mg/m<sup>3</sup> (as F)

**IDLH Level\*** 500 mg/m<sup>3</sup> (as F)

**1985-6 Toxicity Data (LiF)** Guinea pig, oral, LD<sub>50</sub>: 200 mg/kg; Frog, subcutaneous, LD<sub>50</sub>: 280 mg/kg

**1985-6 Toxicity Data [F<sup>-</sup> (fluoride anion) CAS No. 16984-48-8]** Human, oral, TD<sub>01</sub>: 3 mg/kg; Human, oral, LD<sub>01</sub>: 50 mg/kg

**Carcinogenicity** Not listed by the NTP, IARC, nor OSHA

**Acute Effects** Excessive inhalation of LiF causes irritation to nasal passages and throat. Dryness and nosebleeds may occur. Eye or skin contact with solutions, mists, or dusts causes irritation and chemical burns.

**Chronic Effects** Long-term occupational overexposure to fluorides causes fluorosis (bone and ligament changes) and kidney damage.

\* See page 9 of the Glossary for Terms and Abbreviations for definition.

#### ◆ SECTION 5 FIRST AID PROCEDURES

**Get appropriate in-school, paramedic, or community medical attention and support.**

**Eye Contact** Promptly flush eyes with plenty of running water for at least 15 min, including under the eyelids. Get prompt medical attention.

**Skin Contact** Quickly remove contaminated clothing. Flush affected area with large amounts of water and wash with soap and water. After a thorough washing, immediately immerse burned skin in 0.13% iced Zephiran chloride solution. Contact a physician immediately.

**Inhalation** Remove victim from exposure to fresh air and support breathing as necessary. If victim has difficulty breathing or coughing, get medical help.

**Ingestion** Get prompt medical attention and contact a poison control center. Never give anything by mouth to an unconscious or convulsing person. If ingested, rinse victim's mouth thoroughly with water and have that conscious person drink several glasses of milk or milk of magnesia. Do not induce vomiting unless a physician instructs you to.

#### ◆ SECTION 6 FIRE PROCEDURES AND DATA

**Fire Hazards** For major fires, or for fires involving large quantities of chemical materials, firefighters should wear appropriate protective clothing and respirators. A self-contained breathing apparatus (SCBA) is recommended. A water spray may be used to cool fire-exposed containers and reduce vapor concentrations.

**Flash Point and Method** Noncombustible

**Autoignition Temperature** Not applicable

**Flammability Limits in Air (vol. %)** Not applicable

**Hazardous Decomposition Products** May include toxic or corrosive gases or fumes

**Extinguishing Media** LiF does not burn. Use water fog, carbon dioxide, dry chemical, alcohol-type foam, or other media appropriate to surrounding fire conditions.

#### ◆ SECTION 7 PHYSICAL DATA

**Boiling Point (at 1 atm)** 3057.8 °F (1681°C)

**Melting Point (at 1 atm)** 1558.4 °F (848 °C)

**Vapor Pressure at 20 °C, mm Hg** 0

**Solubility in Water (at 25 °C)** 0.13 g/100 ml (slight)\*

**pH of Aqueous Solution** Not found

**Formula Weight** 25.94

**Specific Gravity (H<sub>2</sub>O = 1)** 2.640

\* Soluble in acids, insoluble in alcohol.

**References** 1, 2, 4-7, 10, 12, 14, 73, 87-94, 506;  
Genium's *Material Safety Data Sheets Collection*,  
No. 105 (8/87)

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