

Section 1 – Chemical Product and Company Identification

MSDS Name: Lithium Borohydride in tetrahydrofuran

Chemical Family: Alkali borohydride

Use of the substance: Chemical intermediate

Company: Optima Chemicals Group, LLC
200 Willacoochee Hwy.
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Section 2 – Hazards Identification

Hazards:

In contact with water releases flammable gases, which can ignite spontaneously.

Highly flammable liquid and vapor.

Causes severe skin burns and eye damage.

May cause respiratory irritation.

NFPA Rating: Health: 3 Flammability: 4 Reactivity: 2 Special: W

Precautionary Statements:

Keep from any possible contact with water, due to violent reaction and possible flash fire.

Handle under inert gas, protect from moisture.

Wear chemical splash goggles with a face shield, rubber gloves and rubber clothing.

Keep away from heat/sparks/open flame – No smoking.

Keep Container tightly closed.

Ground/bound container and receiving equipment.

Use explosion-proof electrical, ventilation and lighting equipment.

Use only non-sparking tools.

Take precautionary measures against static discharge.

Do not breathe dust or mist.

Wash thoroughly after handling.

Avoid breathing vapors.

Use only outdoors or in well-ventilated area.
In case of fire, use dry chemical for extinction. Do not use water or Carbon Dioxide.

Section 3 – Composition, Information on Ingredients

<u>CAS #</u>	<u>EC#</u>	<u>Chemical Name</u>	<u>Wt.%</u>
16949-15-8	241-021-7	Lithium Borohydride	3-12
109-99-9	203-726-8	Tetrahydrofuran	88-97

Section 4 – First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, lifting upper and lower lids. Seek medical attention.

Skin: Quickly wipe off as much as possible, then immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Thoroughly wash with soap and water, and seek medical attention.

Ingestion: Quickly wipe material from the mouth, and rinse mouth out with plenty of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention.

Inhalation: Remove from exposure, to fresh air immediately. If not breathing give artificial respiration, and seek medical attention.

Notes to Medical Doctor: This product is corrosive and reacts with water. Formulated product is in a solution: corrosive and reactive properties are still present. Treatment should first involve removing as much of the material as possible as quickly as possible, then flush with large quantities of water. Ingestion presents a singular problem as emesis may produce esophageal damage and/or aspiration damage. Consideration may be given to gastric lavage with a large diameter tube for removal of material and then dilution with large amounts of water. Esophagoscopy may be of assistance in this procedure and to assess extent of damage. Treatment is otherwise symptomatic and supportive.

Section 5 – Fire Fighting Measures

Flammable Limits: Upper: Not available Lower: Not available

General Hazard: Flammable liquid. Reacts violently with water to give off flammable fumes and corrosive dust.

Fire Extinguishing Agents Recommended: Do not use water or CO₂. Use dry chemical.

Hazardous Combustion Products: Lithium hydroxide, boron oxides, carbon dioxide, carbon monoxide.

Special Fire fighting Procedures: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Autoignition temperature: Not applicable.

Flashpoint: -17 degrees C (THF)

Sensitivity to Static Discharge: Yes

Sensitivity to Impact: None

Section 6 – Accidental Release Measures

Remove all sources of ignition. Do not use water in the initial phases of clean up. Contain spill with absorbent. Transfer to approved transport container and clean up spillage with an absorbent. Dispose of waste according to local and Federal laws and regulations. Before cleanup measures begin, review the entire MSDS with particular attention to Section 3, and Section 8.

Section 7 - Handling and Storage

Handling: Use in a closed system under argon or nitrogen. Do not get in eyes, on skin or clothing. Do not breathe vapors or mist.

Storage: Store in cool, dry place. Store in tightly closed container. Keep away from sources of ignition, water, air, acids and oxidizing agents.

Section 8 – Exposure Controls, Personal Protection

Exposure Limits: PEL (OSHA) – 200 ppm, TWA (ACGIH) – 200 ppm, STEL/Ceiling (ACGIH) – 250 ppm.

Engineering Controls: Use in closed system under argon or nitrogen. If personal contact can occur, use local exhaust ventilation (explosion proof), to keep airborne concentrations below exposure limits.

Eyes and Face: Wear splash goggles with a face shield.

Skin: Wear rubber gloves and rubber protective clothing.

Respiratory: When engineering controls are not adequate, wear a NIOSH/MSHA respirator approved for protection against organic vapors and mists.

Work Hygienic Practices: Quick-drench eyewash and safety shower.

Section 9 – Physical and Chemical Properties

Appearance and Odor: Slightly hazy, grayish to black, solvent odor of tetrahydrofuran.

Melting Point: -108 .5 degrees C (THF)	Boiling Point: 66 degrees C (THF)
Flash Point: -17 degrees C (THF)	Vapor Pressure: 145 mm Hg @ 20 degrees C (THF)
Vapor Density: Not applicable	pH: Not applicable
Specific Gravity: 0.896 g/cc @25 degrees C	Percent Volatile: 94-97
Water Solubility: Reacts violently with water	Evaporation Rate: >1
Flammable Limits: Not available	Molecular Weight: 21.78
Autoignition Temperature: Not available	Viscosity: Not available
Decomposition Temperature: Not available	Explosive Properties: Not explosive

Oxidizing Properties: Not an oxidizer

Section 10 – Stability and Reactivity

Stability: Stable under normal handling conditions.

Incompatibility: Heat, fire, air, water, acids and oxidizing chemicals

Hazardous Polymerization: Does not polymerize

Hazardous Decomposition Products: Borane/boron oxides. Liberates flammable/explosive hydrogen gas.

Conditions to Avoid: Water, heat, sparks, open flame.

Section 11 – Toxicological Information

Eyes: No data available for the product.

Skin: No data available for the product.

Ingestion: No data available for the product. THF: Oral LD50 = 1650 mg/kg (rat)

Inhalation: No data available for the product. THF: Inhalation LC50 = 21,000 ppm, 3 hr. (rat)

Acute Effects from Overexposure: No data available for the product. This product contains an alkali borohydride compound which is extremely reactive and corrosive to skin, eyes (may cause blindness), nose, throat and stomach. Inhalation of vapors may cause dizziness, nausea, anesthesia, numbness, burning sensation and motor weakness in fingers and toes, incoordination, and headache. Low viscosity material - if swallowed may enter the lungs and cause lung damage.

Chronic Effects from Overexposure: No data available for the product. Tetrahydrofuran: Repeated or prolonged exposure may cause signs of central nervous system depression and respiratory irritation.

Sensitization: No

Carcinogenicity: No listed by IARC, NTP, OSHA, ACGIH, or EH40.

Mutagenicity: No data available for the product. THF: Negative results in bacterial mutagenicity tests with and without metabolic activation.

Reproductive Toxicity: No data available for the product. THF: One animal study suggests that THF does not cause effects at doses which are not maternally toxic.

Section 12 – Ecological Information

Ecotoxicological Information:

Environmental toxicity testing of the product has not been conducted.

THF: 96 hr. LC50 = 2160 mg/l (fathead minnow) [Handbook of Env. Data on Org. Chem., 4th Ed 2001]. 24 hr. EC50 = 5.93 g/l (Daphnia magna) [AQUIRE 2003].

Chemical Fate Information:

No data available for the product. Lithium borohydride reacts violently with water to form lithium hydroxide, hydrogen, and boron oxides.

THF: THF is expected to volatilize from both water and soil and leach into groundwater. It will not photodegrade or adsorb to sediment. Limited evidence suggests it may biodegrade. Based on a relatively low Kow (0.47), it is not expected to bioconcentrate.

Section 13 – Disposal Considerations

Dispose of in accordance with federal, state, and local regulations.

Section 14 – Transport Information

DOT Shipping: Organometallic substance, liquid, water reactive, flammable, N.O.S. (lithium borohydride in tetrahydrofuran), 4.3 Dangerous when wet (3,flammable), UN3399, PG 1.

Labels: Dangerous when wet, flammable.

Custom Tariff No: 2942.00.0000

Marine Pollutant: No

PIH: Not designated Poison Inhalation Hazard by USDOT.

Section 15 – Regulatory Information

United States:

Section 311 Hazard Category (40CFR 370): Reactive, fire hazard, acute health hazard.

Section 313 Reportable Ingredients (40 CFR 372): No reporting requirements.

Section 302 Extremely Hazardous Substances (40 CFR 355): Not listed.

CERCLA Hazardous Substance (40 CFR 302.4): Tetrahydrofuran has a reportable quantity of 1000 pounds.

TSCA Sec 12B Export Notification: Tetrahydrofuran is subject to these requirements.

TSCA Inventory Status (40 CFR 710): Listed

Canada:

Product Identification No.: 3207

WHMIS: Hazard Classification – Class B, Division 2 (Flammable liquid), Class B, Division 6 (Reactive Flammable Materials/Flammable gas on contact with water), Class E, (Corrosive), Ingredient Disclosure List: Tetrahydrofuran is listed.

Section 16 – Additional Information

Creation Date: 9/28/2009 Revised: 11/20/09

This MSDS has been prepared to meet U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200 and Canada's Workplace Hazardous Materials Information System (WHMIS) requirements.

This information is believed to be accurate and represents the best information currently available to Optima Chemical Group LLC. However, we make no warranty of merchantability, express or implied, with respect to such information and assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.