Material Safety Data Sheet
Lithium borohydride, 2M solution in THF

ACC# 95409

Section 1 - Chemical Product and Company Identification

MSDS Name: Lithium borohydride, 2M solution in THF
Catalog Numbers: AC212930000, AC212931000
Synonyms: Mixture
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
109-99-9	Tetrahydrofuran	>50	203-726-8
16949-15-8	Lithium borohydride	<50	241-021-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: -17 deg C.
Danger! Extremely flammable liquid. Corrosive. Water-reactive. Causes eye and skin burns. Causes digestive and respiratory tract burns. Can be explosive when exposed to heat or flames. May cause central nervous system depression. May form unstable peroxides. May cause liver and kidney damage. Moisture sensitive.
Target Organs: Heart, central nervous system, liver.

Potential Health Effects

Eye: Causes eye burns. May cause irreversible eye injury.
Skin: Contact with skin causes irritation and possible burns, especially if the skin is wet or moist.
Ingestion: May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma. Causes gastrointestinal tract burns. The toxicological properties of this substance have not been fully investigated. Causes cough, sore throat, chest pain, and lightheadedness.
Inhalation: Effects may be delayed. May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract.
Chronic: Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Reacts violently with water giving off flammable gas which may explode. Vapors can travel to a source of ignition and flash back. Can burn in a fire, releasing toxic vapors. Containers may explode in the heat of a fire.
Extinguishing Media: Use foam, dry chemical, or carbon dioxide.
Flash Point: -17 deg C (1.40 deg F)
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: 2 - health, 3 - flammability, 1 - instability

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Contents may develop pressure upon prolonged storage. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not ingest or inhale. Container should be opened by a technically qualified person. Use only in a chemical fume hood. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Store in a cool, dry place. Do not store in direct sunlight. Store in a tightly closed container. Keep under a nitrogen blanket. Keep away from water. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Tetrahydrofuran	50 ppm TWA; 100 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous r oute	200 ppm TWA; 590 mg/m3 TWA 2000 ppm IDLH	200 ppm TWA; 590 mg/m3 TWA
Lithium borohydride	none listed	none listed	none listed

OSHA Vacated PELs: Tetrahydrofuran: 200 ppm TWA; 590 mg/m3 TWA Lithium borohydride: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear a chemical apron. Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear
Odor: Not available.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: reacts
Specific Gravity/Density:.8960g/cm3
Molecular Formula:BH4Li
Molecular Weight:21.77

Section 10 - Stability and Reactivity

Chemical Stability: Prolonged exposure to air and sunlight may form unstable peroxides. Has not been fully evaluated. Peroxide formation may occur in containers that have been opened and remain in storage.
Conditions to Avoid: Exposure to air, contact with water.
Incompatibilities with Other Materials: Strong oxidizing agents, alcohols, acids, moist air or water, halogenated hydrocarbons. Tetrahydrofuran is explosive with potassium hydroxide, NaAlH2, sodium hydroxide and sodium tetrahydroaluminate. It racts with lithium tetrhydroaluminate or borane to form explosive hydrogen gas. It causes a violent reaction with metal halides and a vigorous reaction with bromine.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, oxides of boron, borane, hydrogen gas.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 109-99-9: LU5950000
CAS# 16949-15-8: ED2725000
LD50/LC50:
CAS# 109-99-9:
Inhalation, rat: LC50 = 21000 ppm/3H;
Oral, rat: LD50 = 1650 mg/kg;

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CAS# 16949-15-8:
Oral, mouse: LD50 = 87800 ug/kg;
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Carcinogenicity:
CAS# 109-99-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Not listed.

CAS# 16949-15-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Cas# 109-00-0:LC50(96Hr.) Fathead Minnow = 2160 mg/L
Environmental: Tetrahydrofuran is expected to biodegrade under aerobic conditions but may be resistant to biodegradation in anaerobic environments.
Physical: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere, tetrahydrofuran, which has a vapor pressure of 162 mm Hg at 25 deg C, determined from experimentally-derived coefficients, will exist solely as a vapor in the ambient atmosphere. Vapor-phase tetrahydrofuran is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals and nitrate radicals; the half-lives for these reactions in air are estimated to be about 1 day and 3 days, respectively.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 109-99-9: waste number U213 (Ignitable waste).

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	LITHIUM BOROHYDRIDE	LITHIUM BOROHYDRIDE
Hazard Class:	4.3	4.3
UN Number:	UN1413	UN1413
Packing Group:	I	I

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 109-99-9 is listed on the TSCA inventory.
CAS# 16949-15-8 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
CAS# 109-99-9: Testing required by manufacturers, processors; Test for Health Effects
Section 12b
CAS# 109-99-9: Section 4
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 109-99-9: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 109-99-9: immediate, fire, reactive.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 109-99-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 16949-15-8 can be found on the following state right to know lists: New Jersey.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

F C

Risk Phrases:

R 11 Highly flammable.
R 15 Contact with water liberates extremely flammable gases.
R 19 May form explosive peroxides.
R 34 Causes burns.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 25 Avoid contact with eyes.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face pr
otection.
S 45 In case of accident or if you feel unwell, seek medical advice
immediately (show the label where possible).
S 7/8 Keep container tightly closed and dry.

WGK (Water Danger/Protection)

CAS# 109-99-9: 1
CAS# 16949-15-8: No information available.

Canada - DSL/NDSL

CAS# 109-99-9 is listed on Canada's DSL List.
CAS# 16949-15-8 is listed on Canada's NDSL List.

Canada - WHMIS

not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 109-99-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/02/1999
Revision #4 Date: 10/03/2005