

Safety Data Sheet

1. Identification of the Substance/Mixture and of the Company/Undertaking:

- 1.1 Product Identifier:** LHS in THF/2-Methylbutene
1.1.1 Substances: Not applicable
1.1.2 Mixture name: LHS in THF/2-Methylbutene
Alternate names and trade name: Lithium hexamethyldisilazide, Lithium bis(trimethyl)silylamide, Silanamine, 1,1,1-trimethyl-N-(trimethylsilyl)-lithium salt
- 1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against:**
Industrial Manufacturing
Only to be supplied for industrial uses
For use only as a chemical intermediate under Strictly Controlled Conditions.
- 1.3 Details of the Supplier of the Safety Data Sheet**

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2. Hazards Identification

- 2.1 Classification of the Mixture:**
2.1.1 GHS Classification [EC Regulation No 1272/2008 and US OSHA regulations]
Flammable liquid; Category 2
Skin corrosive; Category 1B
Eye damage; Category 1
Acute oral, dermal and inhalation toxicity; Category 4
Aspiration toxicity; Category 1
Specific target organ systemic toxicity – SE; Category 3
Specific target organ toxicity – SE; Category 3, Central nervous system
Carcinogen; Category 2
Germ cell mutagenicity; Category 2
Hazardous to the aquatic environment – Acute; Category 3
Hazardous to the aquatic environment – Chronic; Category 3
- 2.2.2 EC: Classification according to 67/548/EEC or 1999/45/EC [DSD/DPD]**
F; R11, C; R34, Xn; R20/21/22, Xi; R37. R67, R65; Carc. Cat. 3; R40, Muta. Cat. 3; R68; R52-53

2.2 Label Elements:
2.2.3 Hazard Pictograms:





2.2.4 Signal Word:

Hazard Statement(s):

Danger
 Highly flammable liquid and vapour. H225
 Causes severe skin burns and eye damage H314
 Harmful if swallowed, in contact with skin or if inhaled H302 + H312 + H332
 May be fatal if swallowed and enters airways H304
 May cause respiratory irritation. H335
 May cause drowsiness or dizziness. H336
 Suspected of causing cancer. H351
 Suspected of causing genetic defects. H341
 Harmful to aquatic life with long lasting effects H412

Precautionary Statement(s):

Wear protective gloves/protective clothing/eye protection/face protection. P280
 In case of fire: Use dry chemical for extinction. P370 + P378
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P305 + P351 + P338
 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P301 + P330 + P331
 Immediately call a POISON CENTER or doctor/physician. P310
 IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothing. Rinse skin with water / shower. P303 + P361 + P353
 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P304 + P340

Additional Precautionary Statement(s):

Obtain special instructions before use. P201
 Do not handle until all safety precautions have been read and understood. P202
 Keep away from heat/sparks/open flames/hot surfaces. – No smoking. P210
 Keep container tightly closed. P233
 Ground/bond container and receiving equipment. P240
 Use explosion-proof electrical/ventilating/lighting/.../equipment. P241
 Use only non-sparkling tools. P242
 Take precautionary measures against static discharge. P243
 Do not breathe dust/fume/gas/mist/vapours/spray. P260
 Wash hands thoroughly after handling. P264
 Do not eat, drink or smoke when using this product. P270
 Use only outdoors or in a well-ventilated area. P271
 IF ON SKIN: Wash with plenty of soap and water P302 + P352
 Remove/Take off immediately all contaminated clothing. P361
 Wash contaminated clothing before reuse. P363
 Store in a well-ventilated place. Keep cool. P403 + P235
 Store locked up. P405
 Dispose of contents/ container to an approved waste disposal plant. P501

2.3 Other Hazards

None

3. Composition / Information on Ingredients

3.1 Substances Not applicable.

3.2 Mixtures

3.1.1 GHS Classification [EC: Regulation No 1272/2008; US: OSHA regulations]

<u>Chemical Name</u>	<u>CAS #</u>	<u>EC No</u>	<u>EC Index No</u>	<u>REACH Reg No</u>	<u>Wt.%</u>	<u>Classification, Hazard Statement Codes</u>	
Lithium hexamethyldisilazide (LHS)	4039-32-1	223-725-6	None	None	20 - 28	Skin Corr. 1B	H314

Tetrahydrofuran	109-99-9	203-726-8	203-726-8	None	63 - 78	Flam. Liq. 2 Eye Irrit. 2 STOT SE 3 Carc. 2	H225 H319 H335 H351
2-Methyl-2-butene	513-35-9	208-156-3	None	None	0 - 7	Flam. Liq. 2 Ski Irrit. 2 Acute Tox. oral 4 Asp. Tox. 1 STOT SE 3 Muta. 2; Aquatic Acute 2 Aquatic Chronic 2	H225 H315 H302 H304 H336 H341 H411
Hexamethyldisilazane	999-97-3	213-668-5	None	None	1 - 2	Flam. Liq. 2 Skin Corr. 1B Eye Dam. 1 Acute Tox. oral 4 Acute inhalation Tox. 4 Acute dermal Tox. 3 Aquatic Acute 3 Aquatic Chronic 3	H225 H314 H318 H302 H332 H311 H402 H412

3.1.2 EC: Classification according to 67/548/EEC or 1999/45/EC [DSD/DPD]

Chemical Name	CAS #	EC No	Wt.%	Symbols	R-phrases
Lithium hexamethyldisilazide (LHS)	4039-32-1	223-725-6	20 - 28	C	R34;
Tetrahydrofuran	109-99-9	203-726-8	63 - 78	F; Carc.Cat.3; Xi;	R11 R40 R36/37
2-Methyl-2-butene	513-35-9	208-156-3	0 - 7	F; Xi; Xn; Muta. Cat. 3; N;	R11 R38 R22, R65 R67 R68 R51-53
Hexamethyldisilazane	999-97-3	213-668-5	1 - 2	F; C; Xn;	R11 R34 R20/21/22 R52-53

(See Section 16 for R-phrases text)

4. First Aid Measures

4.1 Description of First Aid Measures

- EYES:** Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.
- SKIN:** Immediately flush with plenty of water while removing contaminated clothing and/or shoes, and thoroughly wash with soap and water. Obtain immediate medical attention. Contact a medical doctor if necessary.
- INGESTION:** Quickly wipe material from the mouth and rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.
- INHALATION:** Remove to fresh air. If breathing discomfort occurs and persists, see a medical doctor. If breathing has stopped, give artificial respiration and see a medical doctor immediately.

4.2 Most Important Symptoms and effects, both acute and delayed

Symptoms of over-exposure will typically be a result of the corrosive nature of the substance with discomfort to skin and if swallowed, local effects with discomfort to the mouth and GI tract. Inhalation of solvent vapours may lead to dizziness and impairment of normal functions.

4.3 Indication of any immediate medical attention and special treatment needed.

Notes to medical doctor:

Product is highly alkaline and is corrosive to the eyes, skin and mucous membranes. Consideration should be given to careful endoscopy as stomach or esophageal burns, perforations or strictures may occur. Careful gastric lavage with an endotracheal tube in place should be considered. Observation may be warranted. Treatment is controlled removal of exposure followed by symptomatic and supportive care.

5. Fire-Fighting Measures

- 5.1 Extinguishing media** DO NOT USE WATER OR CARBON DIOXIDE. Use dry chemical.
- 5.2 Special hazards arising from the substance or mixture**
- Hazardous combustion products** Lithium hydroxide, carbon monoxide, carbon dioxide.
- General Hazard** Flammable liquid. Lithium hexamethyldisilazide reacts with water, generating heat.
- Properties contributing to**
- Flammability** Water reactivity of product, and volatility of solvents.
- Flashpoint** -25°C
- Flammable limits in air** Not available. For tetrahydrofuran: Upper: 2% Lower: 11.8%
- Auto ignition temperature** Not available.
- Sensitivity to static discharge** Yes
- Sensitivity to static impact** Not applicable
- 5.3 Advice for fire-fighters**
Wear full protective clothing and self-contained breathing apparatus (SCBA) approved for fire fighting. This is necessary to protect against the hazards of heat, products of combustion and oxygen deficiency. Do not breathe smoke, gases or vapors generated.

COMMENTS:

(See Section 10, Stability and Reactivity)

6. Accidental Release Measures

- 6.1 Personal precautions, protective equipment and emergency procedures**
Before cleanup measures begin, review the entire SDS with particular attention to Section 2, Hazards Identification; and Section 8, Exposure Controls/Personal Protection. Remove all sources of ignition. Spilled material can catch fire spontaneously on contact with air, moisture, acids or oxidizing materials.
- 6.2 Environmental precautions**
Contain spill. Do not wash into drains. Dispose of at qualified waste disposal facility.
- 6.3 Methods and material for containment and cleaning up**
Remove all sources of ignition. Spilled material can catch fire spontaneously on contact with air, moisture, acids or oxidizing materials. Cover spill with dry extinguishant. DO NOT USE WATER OR CARBON DIOXIDE. Contain spill with absorbant. Expose to air until solvent has dissipated. Sweep up and place in approved transport container. Dispose of waste according to local and Federal laws and regulations.
- 6.4 Reference to other sections**
Before cleanup measures begin, review the entire SDS with particular attention to Section 2, Hazards Identification; and Section 8, Exposure Controls/Personal Protection.
- 6.5 Additional information**
Not specified.

7. Handling and Storage

- 7.1 Precautions for safe handling**
KEEP AWAY FROM WATER, AIR AND OXIDIZING MATERIALS. Wear full face protection and gloves. Use in a closed system under argon or nitrogen.
- 7.2 Conditions for safe storage, including any incompatibilities**
Keep away from heat, sparks and flame. Protect storage container from leaks and physical damage.
- 7.3 Specific end use(s)**
For use only as a chemical intermediate under Strictly Controlled Conditions

8. Exposure Controls / Personal Protection

8.1 Control parameters

Note that DNELs and PNECs have not been derived for lithium hexamethyldisilazide as it is a strictly controlled transported intermediate

DNEL Tetrahydrofuran:

Long-term exposure, systemic, inhalation Not available
 Long-term exposure, systemic, dermal Not available

PNEC Tetrahydrofuran:

Not available

EXPOSURE LIMITS

Chemical Name	EU		EH40 (UK WEL)		USA (ACGIH)		USA (OSHA)	
	TWA	STEL	TWA	STEL	TWA	STEL/Ceiling	PEL	STEL/Ceiling
tetrahydrofuran		100 ppm	50 ppm	100 ppm	50 ppm	100 ppm	200 ppm	

8.2 Exposure controls

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.

Personal protective equipment

Eyes and Face:

Chemical splash goggles with a face shield.

Respiratory:

Wear a respirator approved for protection against organic vapours and mists when adequate ventilation is not available
 US: NIOSH or MSHA approved
 Europe: CEN Class A type

Protective Clothing:

Gloves: Nitrile (typical permeation breakthrough time >480 minutes)
 These glove recommendations should not be used as the absolute basis for glove selection. Actual in-use conditions may vary glove performance from the controlled conditions of laboratory tests. Factors such as concentration and temperature, glove thickness and glove reuse, may affect performance. Other glove requirements, such as length, dexterity, cut, abrasion, puncture and snag resistance, or glove grip need to be considered in making your final selection. For flammable products, the recommended gloves provide chemical but not fire protection

Other: Rubber clothing.

Work Hygienic Practices:

Quick-drench eyewash and safety shower.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance:	Golden yellow solution
Odor:	Ether-like
Odor threshold:	Not available
pH:	Reacts exothermically with water giving mixture with pH >12
Melting point:	108.5°C (-163°F) (tetrahydrofuran)
Boiling point:	66°C (151°F) (tetrahydrofuran)
Flash point:	-25°C
Evaporation rate(butyl acetate = 1):	Not available
Flammability:	Water reactive material in flammable liquid solvent
Flammable limits:	Not applicable for formulation. For tetrahydrofuran: Upper: 2% Lower: 11.8%
Vapor pressure:	162.1 mm Hg at 20 °C (tetrahydrofuran)
Vapor density (air = 1):	2.49 (tetrahydrofuran)
Specific gravity:	0.887 g/ml
Solubility in water:	Reacts exothermically with water

	<u>Partition coefficient n-octanol/ water:</u>	Not available
	<u>Autoignition temperature:</u>	Not available
	<u>Decomposition temperature:</u>	Not available
	<u>Viscosity:</u>	Not available
	<u>Explosive properties:</u>	Not explosive
	<u>Oxidizing properties:</u>	Not an oxidizer
9.2	<u>Other information</u>	
	<u>Self-reactive properties</u>	Does not meet classification criteria.
	<u>Pyrophoric properties</u>	Does not meet classification criteria.
	<u>Self-heating properties</u>	Does not meet classification criteria.
	<u>Water reactive properties</u>	Does not meet classification criteria.
	<u>Corrosive to metals</u>	Does not meet classification criteria.
	<u>Molecular weight:</u>	167.33 (LHS)

10. Stability and Reactivity

10.1	<u>Reactivity</u>	Reactive with water and damp air
10.2	<u>Chemical stability</u>	Stable if kept away from air and moisture.
10.3	<u>Possibility of hazardous reaction</u>	Reaction with water, air, oxidizers, acids to form lithium hydroxide, lithium hydride, t-amyl alcohol.
10.4	<u>Conditions to avoid</u>	Open air. Heat, sparks or flames
10.5	<u>Incompatible materials</u>	Heat, fire, air, water, acids and oxidizing chemicals
10.6	<u>Hazardous decomposition products</u>	Lithium oxide, lithium hydroxide, ammonia, oxides of nitrogen, bis-trimethylsiloxane.

11. Toxicological Information

11.1 **Information on toxicological effects**

The mixture has not been tested, but properties can be predicted based on the properties of the two components

(a) acute toxicity	Lithium hexamethyldisilazide: Corrosive
(b) skin corrosion/irritation	Classified as corrosive on the basis of lithium hexamethyldisilazide
(c) serious eye damage/irritation	Classified as corrosive on the basis of lithium hexamethyldisilazide
(d) respiratory/skin sensitisation	No components are considered to be potential sensitizing agents.
(e) germ cell mutagenicity	Classified as a mutagen, category 2, on the basis of 2-methyl-2-butene.
(f) carcinogenicity	Classified as a carcinogen, category 2, based on tetrahydrofuran.
(g) reproductive toxicity	Classified as not a reproductive toxin based on lithium hexamethyldisilazide and solvents.
(h) STOT-single exposure	Solvents may cause drowsiness or irritate the respiratory tract.
(i) STOT-repeated exposure	Classified as not causing organ damage based on lithium hexamethyldisilazide and solvents.
(j) aspiration hazard	Solvents may be fatal if swallowed and enters airways

Acute Effects From Overexposure:

This product is corrosive to the eyes, skin, mucous membranes, upper respiratory tract, and is water reactive. Inhalation of vapors may cause dizziness, nausea, anesthesia, numbness, burning sensation and motor weakness in fingers and toes, incoordination, and headache. May cause peripheral nervous system disorder and/or damage. 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. Tetrahydrofuran is listed by NTP as a substance that is reasonably anticipated to be a carcinogen. THF gave negative results in bacterial mutagenicity tests with and without metabolic activation. One animal study suggests that THF does not cause effects at doses which are not maternally toxic.

Carcinogenicity Listings

EH40: Tetrahydrofuran is listed.
IARC: Tetrahydrofuran is listed.
NTP: Tetrahydrofuran is listed.
OSHA: Not considered a carcinogen under OSHA.
ACGIH: Tetrahydrofuran is listed.

12. Ecological Information

12.1 Toxicity:

The mixture has not been tested, but properties can be predicted based on the properties of the components

Tetrahydrofuran:

48 hr. LC₅₀ = 2820; 2930 mg/l (orfe) [Handbook Env. Data on Org. Chem., 4th Ed]

96 hr. LC₅₀ = 2160 mg/L (fathead minnow) [Handbook Env. Data on Org. Chem., 4th Ed]

12.2 Persistence and degradability

Lithium hexamethyldisilazide: Lithium hexamethyldisilazide reacts exothermically with water. Hydrolysis products consist of lithium hydroxide and hexamethyldisilazane.

Tetrahydrofuran: Tetrahydrofuran 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.

12.3 Bioaccumulative potential

Not available.

12.4 Mobility in soil

Not available.

12.5 Results of PBT and vPvB assessment

Not available

12.6 Other adverse effects

Due to the nature of the material and the specialist applications, this product is not considered to be a risk to the environment.

13. Disposal Considerations

13.1 Waste treatment methods

Disposal method:

Do not discharge to waste water systems.

Spent solvent may be sent for recovery or used as fuel if permitted under local regulations

Dispose of waste according to local and national laws and regulations.

14. Transport Information

14.1	<u>UN Number</u>	UN2924
14.2	<u>UN proper shipping name (IMDG, ICAO, ADR, DOT)</u>	Flammable liquid, corrosive, N.O.S. (lithium hexamethyldisilazide in tetrahydrofuran)
14.3	<u>Transport hazard class(es) (IMDG, ICAO, ADR, DOT)</u>	3, Flammable liquid, (8, Corrosive)
14.4	<u>Packing group (IMDG, ICAO, ADR, DOT)</u>	II
14.5	<u>Environmental hazards</u>	None.
14.6	<u>Special precautions for user</u>	None
14.7	<u>Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code</u>	None

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EUROPEAN UNION:

German Wassergefährdungsklasse (water hazard class)

lithium hexamethyldisilazide

not listed

tetrahydrofuran	not listed
2-methyl-2-butene	3
hexamethyldisilazane	1

UNITED STATES:

Section 311 Hazard Category (40 CFR 370):

Immediate (acute) health hazard, delayed (chronic) health hazard, fire hazard, reactive

Section 313 Reportable Ingredients (40 CFR 372):

This product does not contain a toxic chemical subject to the reporting requirements of Section 313 of Emergency Planning and Community Right-To-Know Act of 1986.

Section 302 Extremely Hazardous Substances (40 CFR 355):

Not listed

CERCLA Hazardous Substance (40 CFR 302.4):

Tetrahydrofuran is listed. The reportable quantity is 1000 pounds.

TSCA Sec 12b Export Notification:

This product is subject to TSCA 12(b) export notification requirements due to the presence of tetrahydrofuran.

NFPA Rating:

Health: 3 Flammability: 3 Reactivity: 2 Special: W

INTERNATIONAL INVENTORY STATUS:

<u>Inventory/Country</u>	<u>Product Status</u>
EINECS (EU)	Listed
TSCA (US)	Listed
ECL (Korea)	Not listed
DSL (Canada)	Not listed

15.2 Chemical Safety Assessment

Not available.

16. Other Information

European Union:

Highly flammable	R11
Causes burns	R34
Harmful if swallowed	R22
Harmful in contact with skin	R21
Harmful by inhalation	R20
Harmful: may cause lung damage if swallowed	R65
Irritating to skin	R38
Irritating to eyes	R36
Irritating to respiratory system	R37
Vapours may cause drowsiness and dizziness	R67
Limited evidence of a carcinogenic effect	R40
Possible risk of irreversible effects	R68
Harmful by inhalation, in contact with skin and if swallowed	R20/21/22
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment	R51-53
Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment	R52-53

List of Abbreviations used in this SDS:

PBT	Persistent, Bioaccumulative and Toxic
vPvB	very Persistent, very Bioaccumulative
PEC	Predicted environmental concentration
PNEC	Predicted no effect concentration
DNEL	Derived no effect level

Specific uses identified for Exposure Scenarios

Not available

REVISION SUMMARY: Revision # 0. All new SDS.

This SDS has been prepared to meet and U. S. OSHA Hazard Communication Standard requirements.
type 2c

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