
1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Lithium t-Butoxide in THF
CHEMICAL FAMILY: Alkali Metal Alkoxide
MOLECULAR FORMULA: C₄H₉LiO
SYNONYM(s): Lithium tertiary Butoxide, Lithium tertiary Butylate
ALTERNATE TRADE NAME(S): Lithium t-Butoxide in Tetrahydrofuran, LTB
GENERAL USE: Industrial Manufacturing

MANUFACTURER
FMC CORPORATION
Lithium Division
P.O. Box 795
Bessemer City, NC 28016-0795
General Information: (704) 868-5300

Emergency Telephone Numbers:
CHEMTREC (800) 424-9300
Emergency Phone (704) 629-5361 (Plant) Call Collect 24 Hr/Day
Emergency Phone (303) 595-9048 (Medical) Call Collect

2. HAZARDS IDENTIFICATION

CLASSIFICATION: Flammable liquid, Category 2
Corrosive to skin; Category 1A
Specific target organ systemic toxicity – Single exposure; Category 3

LABELING:

SYMBOLS: Flame, Corrosion, Exclamation mark
SIGNAL WORD: Danger
HAZARD STATEMENTS: Highly flammable liquid and vapour
Causes severe skin burns and eye damage
May cause respiratory irritation
PRECAUTIONARY STATEMENTS:
Prevention:
Keep away from heat, sparks or open flame- No smoking.
Keep container tightly closed.
Ground/Bond container and receiving equipment.
Use explosion-proof electrical, ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear chemical splash goggles with a face shield, rubber gloves and rubber clothing.
Do not breathe dusts or mists.
Wash thoroughly after handling.
Avoid breathing vapors.
Use only outdoors or in a well ventilated area.
Response:
In case of fire, DO NOT USE WATER OR CARBON DIOXIDE. Use dry chemical.
First Aid:
See Section 4 of the MSDS.
Storage
See Section 7 of the MSDS.
Disposal
See Section 13 of the MSDS.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS #	EC No	Wt.%	Classification, Hazard Statement Codes
Lithium t-Butoxide	1907-33-1	217-611-5	17 - 23	Skin Corr. Cat 1A H314
tert-Butyl alcohol	75-65-0	200-889-7	0.3 - 4	Flam. liq. Cat. 2 H225 Acute Tox. Cat. 4 H332
Tetrahydrofuran	109-99-9	203-726-8	77 - 83	Flam. liq. Cat. 2 H225 Eye Irrit. Cat. 2 H319 STOT SE Cat. 3 H335

4. FIRST AID MEASURES

<u>EYES:</u>	Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.
<u>SKIN:</u>	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.
<u>INGESTION:</u>	Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.
<u>INHALATION:</u>	Remove to fresh air. If breathing difficulty or discomfort occurs and persists, see a medical doctor. If breathing has stopped, give artificial respiration and see a medical doctor immediately.

NOTES TO MEDICAL DOCTOR:

Product has a high pH and is corrosive to 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

<u>FLAMMABLE LIMITS:</u>	Upper: 11.8% (THF) Lower: 2% (THF)
<u>GENERAL HAZARD:</u>	Flammable liquid. Reacts vigorously with water to give off flammable fumes and corrosive dust.
<u>EXTINGUISHING MEDIA:</u>	DO NOT USE WATER OR CARBON DIOXIDE. Use dry chemical.
<u>HAZARDOUS COMBUSTION PRODUCTS:</u>	Lithium hydroxide, carbon dioxide, carbon monoxide.
<u>FIRE FIGHTING PROCEDURES:</u>	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.
<u>AUTOIGNITION TEMPERATURE:</u>	Not available
<u>PROPERTIES CONTRIBUTING TO FLAMMABILITY:</u>	Water reactivity and volatility of solvents.
<u>FLASH POINT:</u>	-20°C (-8°F)
<u>SENSITIVITY TO STATIC DISCHARGE:</u>	Yes
<u>SENSITIVITY TO IMPACT:</u>	None

COMMENTS:

(See Section 10, Stability and Reactivity)

6. ACCIDENTAL RELEASE MEASURES

<u>RELEASE NOTES:</u>	Remove all sources of ignition. Do not use water in the initial phases
------------------------------	--

of clean up. Contain spill with absorbant. Transfer to approved transport container and clean up spillage with an absorbant. 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, Emergency Overview and Potential Health Effects; and Section 8, Recommended Personal Protective Equipment.

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 a cool place. Keep container closed. Keep away from sources of ignition, water, air, acids and oxidizing agents.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

<u>Chemical Name</u>	<u>TWA (ACGIH)</u>	<u>STEL/Ceiling (ACGIH)</u>	<u>PEL (OSHA)</u>	<u>STEL/Ceiling (OSHA)</u>
tetrahydrofuran	200 ppm	250 ppm	200 ppm	
tert-Butyl alcohol, hydrolysis product and impurity	100 ppm		100 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.

PERSONAL PROTECTIVE EQUIPMENT

Eyes And Face:

Chemical splash goggles with a face shield.

Respiratory:

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

Protective Clothing:

Rubber gloves and rubber clothing.

Work Hygienic Practices:

Quick-drench eyewash and safety shower.

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:

Of tetrahydrofuran

APPEARANCE:

Liquid, colorless to yellow

pH:

Reacts vigorously with water to give pH >12

PERCENT VOLATILE:

77 to 83

VAPOR PRESSURE:

162.1 mm Hg at 20 °C (THF), 31 mm Hg (tert-butyl alcohol), @20°C

VAPOR DENSITY:

(Air = 1): 2

BOILING POINT:

66 °C (THF)

MELTING POINT:

<-35°C (-26°F)

SOLUBILITY IN WATER:

Exothermic reaction to form basic lithium hydroxide and tertiary butanol

EVAPORATION RATE(Butyl Acetate = 1):

8 (THF)

SPECIFIC GRAVITY:

0.886 g/ml

MOLECULAR WEIGHT:

80.05

<u>COEFF. OIL/WATER:</u>	Not applicable
<u>ODOR THRESHOLD:</u>	Not applicable
<u>FLAMMABLE LIMITS:</u>	Upper: 11.8% (THF) Lower: 2% (THF)
<u>FLASH POINT:</u>	-20°C (-8°F)
<u>AUTOIGNITION TEMPERATURE:</u>	Not available
<u>VISCOSITY:</u>	Not available
<u>FLAMMABILITY:</u>	Water reactive material in flammable liquid solvent
<u>DECOMPOSITION TEMPERATURE:</u>	Not available
<u>EXPLOSIVE PROPERTIES:</u>	Not explosive
<u>OXIDIZING PROPERTIES:</u>	Not an oxidizer

10. STABILITY AND REACTIVITY

<u>CONDITIONS TO AVOID:</u>	Water, heat, sparks, open flame.
<u>STABILITY:</u>	Stable
<u>POLYMERIZATION:</u>	Does not polymerize
<u>HAZARDOUS DECOMPOSITION PRODUCTS:</u>	Lithium hydroxide, flammable hydrocarbons and alcohols
<u>INCOMPATIBLE MATERIALS:</u>	Heat, fire, air, water, acids and oxidizing chemicals

11. TOXICOLOGICAL INFORMATION

<u>Eye Contact:</u>	No data available for the product. Lithium t-Butoxide: Corrosive
<u>Skin Contact:</u>	No data available for the product. Lithium t-Butoxide: Corrosive
<u>Skin Absorption:</u>	No data available for the product. Lithium t-Butoxide: Corrosive t-butanol, hydrolysis product and impurity: Dermal [RTECS] LD ₅₀ : >2 mg/kg (rabbit)
<u>Ingestion:</u>	No data available for the product. Lithium t-Butoxide: Oral LD ₅₀ : = 1682 mg/kg (mouse) [RTECS] t-butanol, hydrolysis product and impurity: Oral LD ₅₀ : = 2743 mg/kg (rat) [RTECS] THF: LD ₅₀ = 1650 mg/kg (rat) [RTECS]
<u>Inhalation:</u>	No data available for the product. Lithium t-Butoxide: Corrosive t-butanol, hydrolysis product and impurity: Inhalation [RTECS] LC ₅₀ : >10000 ppm (4 hr. rat) THF: LC ₅₀ = 21,000 ppm , 3 hr., (rat) [RTECS]

Acute Effects From Overexposure:

No data available for the product. This product is corrosive to skin, eyes (may cause blindness), mucous membranes and upper respiratory tract.

Tetrahydrofuran: Inhalation of vapors may cause dizziness, nausea, anesthesia, numbness, motor weakness in fingers and toes, incoordination, and headache.

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. This material has been shown to induce tumors in laboratory animals. Tetrahydrofuran did not produced genetic damage in bacterial or mammalian cell cultures or in animals. Testing for reproductive effects showed no change in reproductive performance.

t-Butanol: Oral administration of t-butanol to laboratory animals has caused fetotoxic effects. Mutagenic effects have been observed in tests with bacteria. Studies conducted by the NTP on long-term drinking water effects of t-butanol indicate some evidence of carcinogenicity in male rats and female mice, and equivocal evidence in male mice.

Sensitization:

No data available for the product.

Carcinogenicity:

EH40: Not listed.

IARC: Not listed.

NTP: Tetrahydrofuran is listed as a substance that is reasonably anticipated to be a carcinogen.

OSHA: Not considered a carcinogen under OSHA.

ACGIH: t-Butanol is listed as Category A4, not classifiable as a human carcinogen. Tetrahydrofuran is listed as Category A3, a confirmed animal carcinogen with unknown relevance to humans.

Mutagenicity:

No data available for the product.

THF: THF gave 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 reproductive effects at doses which are not maternally toxic.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:

Environmental toxicity testing of the product has not been carried out.

t-butanol (hydrolysis product):

24-48 hr. EC₅₀ = 5,504 mg/L (daphnia magna) [Handbook Env. Data on Org. Chem. 4th Ed.]

96 hr. LC₅₀ = 6,410 mg/L (Leuciscus idus - orfe) [Handbook Env. Data on Org. Chem. 4th Ed.]

THF: 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]

Chemical Fate Information:

No data available for the product. Lithium t-butoxide reacts violently with water to form t-butanol and lithium hydroxide.

Tetrahydrofuran: 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.

t-Butanol: t-Butanol is expected to readily volatilize from both water and soil. It is not expected to adsorb to sediment or bioconcentrate in aquatic organisms. t-Butanol is expected to be very mobile in soil (estimated Koc of 36.9), and may leach to groundwater. It is expected to biodegrade in both soil and groundwater. An estimated bioconcentration factor (BCF) of 1.08 indicates a very low tendency to bioaccumulate. It is not expected to bioaccumulate (BCF 1.08).

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD:

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

14. TRANSPORT INFORMATION

UN NUMBER: UN2924
PROPER SHIPPING NAME: Flammable liquid, corrosive, N.O.S. (lithium t-butoxide in THF)
CLASSIFICATION: 3, Flammable liquid, (8, Corrosive)
LABELS: Flammable, Corrosive
PACKING GROUP: II
FLASH POINT: -20°C (-8°F)
CUSTOM TARIFF NO.: 2905.14.1000
MARINE POLLUTANT: No
PIH: Not designated Poison Inhalation Hazard by US DOT.

15. REGULATORY INFORMATION

UNITED STATES

SECTION 311 HAZARD CATEGORY (40 CFR 370):

Reactive, fire hazard, immediate (acute) health hazard.

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):

This product contains tertiary butanol which is a substance subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986.

This information must be included in all MSDS's that are copied and distributed for this material.

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.

TSCA INVENTORY STATUS (40 CFR 710):

Listed

CANADA

WHMIS:

Product Identification No.: 2924

Hazard Classification: Class B, Division 2 (Flammable liquid)

Class B, Division 6 (Reactive Flammable

Materials/Flammable gas on contact with water)

Class D, Division 2B (Toxic Material with Chronic Effects)

Class E, (Corrosive)

Ingredient Disclosure List: Tetrahydrofuran and t-butanol are listed.

16. OTHER INFORMATION

REVISION SUMMARY: Revision # 8: Regular review completed. Sections 2, 3, 9, 14 & 16 revised.

NFPA RATING

HEALTH: 3

FLAMMABILITY: 3

REACTIVITY: 2

SPECIAL: ~~W~~

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.
type 2c

Copyright 2009. FMC Corporation, Lithium Division. All Rights Reserved. FMC Lithium and the FMC Lithium logo are trademarks of FMC Corporation.