FMC Lithium

Material Safety Data Sheet

MSDS Ref. No: QS-MSD-186
Version: US/Canada
Date Approved: 01/05/09
Revision No: 5

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: n-Butyllithium in Cyclohexane
CHEMICAL FAMILY: Alkyllithiums
MOLECULAR FORMULA: C_4H_9Li
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:
Pyrophoric liquid; Category 1
Substances which on contact with water, emit flammable gases; Category 1
Flammable liquid; Category 2
Corrosive to skin; Category 1
Corrosive to eyes; Category 1
Aspiration hazard; Category 1
Reproductive toxicity; Category 2
Specific target organ systemic toxicity – Single exposure; Category 3
Specific target organ systemic toxicity – Repeated exposure; Category 2
Hazardous to the aquatic environment – Acute; Category 1
Hazardous to the aquatic environment – Chronic; Category 1

Labeling:

Symbols: Flame, corrosion, health hazard, environment, exclamation mark

Signal Word: Danger

Hazard Statements:
Catches fire spontaneously if exposed to air
In contact with water releases flammable gases, which may ignite spontaneously
Causes severe skin burns and eye damage
Highly flammable liquid and vapour
May be fatal if swallowed and enters airways
May cause drowsiness or dizziness
May cause damage to the central nerve system or peripheral nerve system through prolonged or repeated exposure
Suspected of damaging fertility or the unborn child
Very toxic to the aquatic environment
Very toxic to aquatic life with long term effects

Precautionary Statements:
Prevention:
Do not allow contact with air.
Keep from any possible contact with water, because of violent reaction and possible flash fire.
Handle under inert gas, protect from moisture.
Keep away from ignition sources such as heat/sparks/open flame- No smoking. Keep container tightly closed.
Wear chemical splash goggles with a face shield, rubber gloves and rubber clothing.

Wash thoroughly after handling.
Wash contaminated clothing before reuse.
Ground/Bond container and receiving equipment.
Use only outdoors or in well ventilated area.
Do not breathe vapours.
Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required.

Response
In case of fire DO NOT USE WATER OR CARBON DIOXIDE. Use dry chemical. Collect spillage

First Aid
See Section 4 of the MSDS.

Storage
See Section 7 of the MSDS.

Disposal
See Section 13 of the MSDS.

COMMENTS:
(See Section 11, Toxicological Information)

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Wt.%
n-Butyllithium	109-72-8	10 - 30
Cyclohexane	110-82-7	70 - 90
Heptanes [1]	64742-49-0	0-10
Hexanes [2]	not available	0-10

[1] Contains predominately C7 isomers with remaining constituents C8 isomers. Contains n-heptane CAS# 142-82-5, and methylcyclohexane CAS# 108-87-2
[2] Contains n-hexane, CAS# 110-54-3

4. 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.

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

FLAMMABLE LIMITS:	Not applicable for formulation. For cyclohexane: Upper: 8%; Lower: 1.3%
GENERAL HAZARD:	Pyrophoric. Flammable liquid.
EXTINGUISHING MEDIA:	DO NOT USE WATER OR CARBON DIOXIDE. Use dry chemical.
HAZARDOUS COMBUSTION PRODUCTS:	Lithium hydroxide, carbon monoxide, carbon dioxide.
FIRE FIGHTING PROCEDURES:	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.
AUTOIGNITION TEMPERATURE:	Not applicable.
PROPERTIES CONTRIBUTING TO FLAMMABILITY:	Water reactivity (pyrophoricity) of product, and volatility of solvents.
FLASH POINT:	Not applicable. The flashpoint of cyclohexane is -18.3 °C (Closed Cup)
SENSITIVITY TO STATIC DISCHARGE:	Yes
SENSITIVITY TO IMPACT:	Not applicable.
COMMENTS: (See Section 10, Stability and Reactivity)	

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES:	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. 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:	KEEP AWAY FROM WATER, AIR AND OXIDIZING MATERIALS. Wear full face protection and gloves. Use in a closed system under argon or nitrogen.
STORAGE:	Keep away from heat, sparks and flame. Protect storage container from leaks and physical damage.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	TWA (ACGIH)	STEL/Ceiling (ACGIH)	PEL (OSHA)	STEL/Ceiling (OSHA)
Cyclohexane	300 ppm		300 ppm	
n-Heptane	400 ppm	500 ppm	500 ppm	
n-Hexane	50 ppm		500 ppm	
methylcyclohexane	400 ppm		500 ppm	
Butane, a hydrolysis product (listed as aliphatic hydrocarbon gases: $C_1 – C_4$)	1000 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, dusts and mists.
Protective Clothing:	Rubber gloves and rubber clothing.
Work Hygienic Practices:	Quick-drench eyewash and safety shower.

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	Gasoline-like
APPEARANCE:	Clear, water-white to pale yellow liquid
pH:	Reacts violently with water giving mixture with pH >12
PERCENT VOLATILE:	70-90
VAPOR PRESSURE:	cyclohexane: 3.26 psi @ 37.8 ºC
VAPOR DENSITY:	(Air = 1): cyclohexane: 2.9
BOILING POINT:	cyclohexane: (81°C)
MELTING POINT:	Not available. Melting point of cyclohexane is 6.5ºC.
SOLUBILITY IN WATER:	Reacts violently with water
EVAPORATION RATE(Butyl Acetate = 1):	cyclohexane: 6.1
SPECIFIC GRAVITY:	0.7-0.8 g.ml @ 20ºC (68ºF)
MOLECULAR WEIGHT:	64.06
COEFF. OIL/WATER:	Not applicable
ODOR THRESHOLD:	Not applicable
FLAMMABLE LIMITS:	Not applicable for formulation. For cyclohexane: Upper: 8%; Lower: 1.3%
FLASH POINT:	Not applicable. The flashpoint of cyclohexane is -18.3 °C (Closed Cup)
AUTOIGNITION TEMPERATURE:	Not applicable
VISCOSITY:	Not available
FLAMMABILITY:	Pyrophoric and water reactive material in flammable liquid solvent
DECOMPOSITION TEMPERATURE:	Not available
EXPLOSIVE PROPERTIES:	Not explosive
OXIDIZING PROPERTIES:	Not an oxidizer

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Heat, sparks or flames
STABILITY:	Stable
POLYMERIZATION:	Will not occur
HAZARDOUS DECOMPOSITION PRODUCTS:	Lithium hydroxide, lithium hydride, butane gas.
INCOMPATIBLE MATERIALS:	Water, air, oxidizers, carbon dioxide, acids

11. TOXICOLOGICAL INFORMATION

Eye Contact:	No data available for the product. n-butyllithium: Corrosive.

Skin Contact:
No data available for the product.
n-butyllithium: Corrosive.

Skin Absorption:
No data available for the product.
n-butyllithium: Corrosive.

Ingestion:
No data available for the product.
Cyclohexane:
Oral LD_{50}: 12705 mg/kg (rat) [RTECS]
n-hexane:
Oral LD_{50} = 25 g/kg (rat) [RTECS]

Inhalation:
No data available for the product.
Cyclohexane:
Inhalation LC_{50}: 70000 mg/m^3/2H (mouse) [RTECS]
n-hexane:
Inhalation LC_{50} = 48000 ppm/4H (rat) [RTECS]
n-Heptane:
Inhalation LC_{50} 103 gm/m^3/4H (rat) [RTECS]
Butane (hydrolysis product):
LC_{50} = 658 g/m^3/4H (rat) [RTECS]

Acute Effects From Overexposure:
No data available for the formulation. This product contains an alkyllithium compound which is extremely reactive and corrosive to the 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.

n-hexane: May cause peripheral nervous system disorder and/or damage. Blurred vision is associated with hexane polyneuropathy.

Chronic Effects From Overexposure:
No data available for the formulation.

Prolonged contact with cyclohexane, hexane or heptane may cause defatting of the skin and skin irritation.

Hexane: Overexposure to n-hexane may cause progressive and potentially irreversible damage to the peripheral nervous system, particularly in the arms and legs. The neurotoxic effects of n-hexane vapour can be enhanced in rats by both methyl ethyl ketone (MEK) and lead acetate. The available information does not suggest that n-hexane is mutagenic. Negative mutagenicity results were obtained in most tests using live animals and relevant routes of exposure. n-Hexane has caused severe testicular damage in male rats at concentrations which have produced significant other toxicity.

Sensitization:
No
n-hexane: There have been no reports of skin sensitization in people occupationally exposed to n-hexane.

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

Mutagenicity:
No
Hexane: The available information does not suggest that n-hexane is mutagenic. Negative mutagenicity results were obtained in most tests using live animals and relevant routes of exposure.
Butane: Negative results were reported on short-term tests using bacteria.

Reproductive Toxicity: No
n-hexane: n-Hexane has caused severe testicular damage in male rats at concentrations which have produced significant other toxicity.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:
Environmental toxicity testing of the product has not been carried out.
Cyclohexane:
24-96h LC_{50} 43-32 mg/l (fathead minnow) [Handbook of Environmental Data on Org. Chem., 4th Ed]
n-Hexane:
24h LC_{50} 4 mg/L (goldfish) [Handbook Env. Data on Org. Chem., 4th Ed]
48h EC_{50} 2.1mg/L (daphnia) [Handbook Env. Data on Org. Chem., 4th Ed]
96h LC_{50} = 1079 mg/L (algae) [Handbook Env. Data on Org. Chem., 4th Ed]
n-Heptane:
24h LC_{50} = 4 mg/L (goldfish) [Env. Data on Org. Chem, 4th ed]
24-96h LC_{50} = 4924 mg/L (mosquito fish) [Env. Data on Org. Chem, 4th ed]
48h EC_{50} = 1.5 mg/L (daphnia magna) [Env. Data on Org. Chem, 4th ed]

Chemical Fate Information:
This product reacts violently with water to form butane and lithium hydroxide.

Cyclohexane is expected to evaporate rapidly if released to land or water. The volatilization half-life from a body of water has been estimated to be as low as 2.8 hours. In the atmosphere, cyclohexane will degrade with a half-life of 52 hours. When absorbed into soil, cyclohexane is not expected to readily biodegrade. However, microorganisms from an oil-exposed environment have been shown to biodegrade cyclohexane.

n-Hexane: Hexane readily volatilizes, biodegrades in soil, water and wastewater treatment plants, adsorbs to organic matter in aquatic systems, has low mobility in soil. Log BCF = 2.24 to 2.89.

n-Heptane will readily volatize from both soil and water. If released to water the product will float. The product is insoluble in water. If released to soil it will evaporate at a rapid rate. The product is poorly absorbed onto soils or sediments. The product is expected to be readily biodegradable. Photochemical degradation in air will proceed at a moderate rate. BOD5 = 55% of ThOD. Heptane is not expected to bioaccumulate.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Dispose of waste according to local and Federal laws and regulations.

14. TRANSPORT INFORMATION

UN NUMBER:	UN3394
PROPER SHIPPING NAME:	Organometallic substance, liquid, pyrophoric, water-reactive (n-butyllithium, hydrocarbon solution)
CLASSIFICATION:	4.2, Spontaneously combustible, (4.3, Dangerous When Wet)
LABELS:	Spontaneously Combustible, Dangerous When Wet
PACKING GROUP:	I
FLASH POINT:	Not applicable. The flashpoint of cyclohexane is -18.3 °C (Closed Cup)
CUSTOM TARIFF NO:	2931.00.9160
MARINE POLLUTANT:	No
PIH:	Not designated Poison Inhalation Hazard by US DOT.

15. REGULATORY INFORMATION

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 contains cyclohexane 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):	Cyclohexane, n-hexane and hexanes are listed. The reportable quantities are respectively 1000 lbs, 5000 lbs and 5000 lbs.
TSCA SEC 12B EXPORT NOTIFICATION:	This product is subject to TSCA 12(b) export notification requirements due to the presence of heptane.
TSCA INVENTORY STATUS (40 CFR 710):	Listed
CANADA	
WHMIS:	Product Identification No.: 3394 Hazard Classification: Class B, Division 6 (Reactive Flammable Materials) Class E, (Corrosive) Class D, Division 2B (Toxic Material with Chronic Effects) Ingredient Disclosure List: Cyclohexane, heptane and hexane are listed

16. OTHER INFORMATION

REVISION SUMMARY: Revision # 6: Regular review conducted. Sections 2, 3, 9 & 14 revised.

NFPA RATING

HEALTH: 3
FLAMMABILITY: 4
REACTIVITY: 3
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 4