1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: t-Butyllithium in Heptane
CHEMICAL FAMILY: Alkylithium
MOLECULAR FORMULA: C₃H₇Li
SYNONYM(s): t-Butyllithium; 2-Lithio-2-Methylpropane
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. COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>Wt.%</th>
</tr>
</thead>
<tbody>
<tr>
<td>tertiary-Butyllithium</td>
<td>694-19-4</td>
<td>15 - 30</td>
</tr>
<tr>
<td>Heptanes</td>
<td>64742-49-0</td>
<td>70 - 85</td>
</tr>
</tbody>
</table>

Contains predominately C7 isomers with remaining constituents C8 isomers. Contains n-heptane CAS# 142-82-5, and methylcyclohexane CAS# 108-87-2

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
Pyrophoric liquid. Can catch fire if exposed to air. Reacts violently with water to give off flammable gases and corrosive dusts. Corrosive to eyes (may cause blindness), skin, nose, throat and stomach. Can catch fire on contact with body moisture or if exposed to air. Inhalation of vapors may cause dizziness, nausea, anesthesia, numbness, motor weakness in fingers and toes, incoordination, and headache. If ingested, may produce a lung aspiration hazard

IMMEDIATE CONCERNS:

POTENTIAL HEALTH EFFECTS:

COMMENTS:
(See Section 11, Toxicological information)

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:

GENERAL HAZARD:

EXTINGUISHING MEDIA:

HAZARDOUS COMBUSTION PRODUCTS:

FIRE FIGHTING PROCEDURES:

AUTOIGNITION TEMPERATURE:

PROPERTIES CONTRIBUTING TO FLAMMABILITY:

FLASH POINT:

SENSITIVITY TO STATIC DISCHARGE:

SENSITIVITY TO IMPACT:

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EXTINGUISHING MEDIA:

HAZARDOUS COMBUSTION PRODUCTS:

FIRE FIGHTING PROCEDURES:

AUTOIGNITION TEMPERATURE:

PROPERTIES CONTRIBUTING TO FLAMMABILITY:

FLASH POINT:

SENSITIVITY TO STATIC DISCHARGE:

SENSITIVITY TO IMPACT:

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 extinguishing agent. DO NOT USE WATER OR CARBON DIOXIDE. Contain spill with absorbent. 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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>TWA (ACGIH)</th>
<th>STEL/Ceiling (ACGIH)</th>
<th>PEL (OSHA)</th>
<th>STEL/Ceiling (OSHA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Heptane</td>
<td>400 ppm</td>
<td>500 ppm</td>
<td>500 ppm</td>
<td>500 ppm</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Eyes And Face:</th>
<th>Chemical splash goggles with a face shield.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory:</td>
<td>When engineering controls are not adequate, wear a NIOSH/MSHA respirator approved for protection against organic vapors, dusts and mists.</td>
</tr>
<tr>
<td>Protective Clothing:</td>
<td>Rubber gloves and rubber clothing.</td>
</tr>
</tbody>
</table>

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>ODOR:</th>
<th>Gasoline-like</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPEARANCE:</td>
<td>Clear, water-white to pale yellow liquid</td>
</tr>
<tr>
<td>pH:</td>
<td>Reacts vigorously to give pH &gt; 12</td>
</tr>
<tr>
<td>PERCENT VOLATILE:</td>
<td>70-80</td>
</tr>
<tr>
<td>VAPOR PRESSURE:</td>
<td>44.6 mmHg @ 20°C (heptane, estimate)</td>
</tr>
<tr>
<td>VAPOR DENSITY:</td>
<td>Not available</td>
</tr>
<tr>
<td>BOILING POINT:</td>
<td>94-99 °C (heptane, approximate)</td>
</tr>
<tr>
<td>MELTING POINT:</td>
<td>Not available</td>
</tr>
<tr>
<td>SOLUBILITY IN WATER:</td>
<td>Reacts violently with water</td>
</tr>
<tr>
<td>EVAPORATION RATE (Butyl Acetate = 1):</td>
<td>5.0 (heptane, approximate)</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY:</td>
<td>0.7 g/ml @ 20°C</td>
</tr>
<tr>
<td>MOLECULAR WEIGHT:</td>
<td>64.06</td>
</tr>
<tr>
<td>COEFF. OIL/WATER:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>ODOR THRESHOLD:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>FLAMMABLE LIMITS:</td>
<td>Not applicable for formulation. For heptane (approximate): Upper: 6.7% Lower: 1.1%</td>
</tr>
<tr>
<td>FLASH POINT:</td>
<td>Not applicable. The flashpoint of heptane is −7.8 °C</td>
</tr>
<tr>
<td>AUTOIGNITION TEMPERATURE:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>EXPLOSIVE PROPERTIES:</td>
<td>Not explosive</td>
</tr>
<tr>
<td>OXIDIZING PROPERTIES:</td>
<td>Not an oxidizer</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

| CONDITIONS TO AVOID: | Heat, sparks or flames |
| STABILITY: | Stable |
| POLYMERIZATION: | Does not polymerize |
| HAZARDOUS DECOMPOSITION PRODUCTS: | Lithium hydroxide, lithium hydride, butane gas |

11. TOXICOLOGICAL INFORMATION

| INCOMPATIBLE MATERIALS: | Water, air, oxidizers, carbon dioxide, acids |
Eye Contact: No data available for the product.  
t-Butyllithium: Corrosive.

Skin Contact: No data available for the product.  
t-Butyllithium: Corrosive.

Skin Absorption: No data available for the product.  
t-Butyllithium: Corrosive.

Ingestion: No data available for the product.  
t-Butyllithium: Corrosive.

Inhalation: No data available for the product.  
t-Butyllithium: Corrosive.

n-Heptane:  
Inhalation LC₅₀ = 103 gm/m²/4H (rat)  

Acute Effects From Overexposure:  
No data available for the formulation. This product contains an alkyl lithium 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.

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

Heptane: Prolonged contact with heptane may cause defatting of the skin and skin irritation.

Sensitization: No

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

Mutagenicity: No

Reproductive Toxicity: No

12. ECOLOGICAL INFORMATION

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

n-Heptane:  
24h LC₅₀ =  4 mg/L (goldfish) [Env. Data on Org. Chem, 4th ed]  
24-96h LC₅₀ =  4924 mg/L (mosquito fish) [Env. Data on Org. Chem, 4th ed]  
48h EC₅₀ =  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.

n-Heptane will readily volatilize 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

PROPER SHIPPING NAME: Organometallic substance, liquid, pyrophoric, water-reactive (tert-butyllithium, hydrocarbon solution)

CLASSIFICATION:

4.2. Spontaneously combustible. (4.3, Dangerous When Wet)
Spontaneously Combustible, Dangerous When Wet

UN NUMBER: UN3394
PACKING GROUP: I
CUSTOM TARIFF NO: 2931.00.9060
MARINE POLLUTANT: No

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 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):
Not listed

TSCA SEC 12B EXPORT NOTIFICATION:
This product is subject to TSCA 12(b) export notification requirements due to the presence of heptane.

Listed

TSCA INVENTORY STATUS (40 CFR 710):

CANADA

WHMIS:

Product Identification No.: 3394
Hazard Classification: Class B, Division 6 (Reactive Flammable Materials)
Class E, (Corrosive)
Ingredient Disclosure List: Heptane is listed

16. OTHER INFORMATION

REVISION SUMMARY: Revision # 4: Regular review completed. Sections 2, 5, 9, 11, 12, 14 and 15 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
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