1 Identification

- **Product name**
  - Trade name: 2,2,6,6-Tetramethylpiperidinylmagnesium chloride, lithium chloride complex 1.0M (18wt% ±2wt%) in toluene/tetrahydrofuran

- **Item number:** 12-0832

- **Details of the supplier of the safety data sheet**
  - **Manufacturer/Supplier:** Strem Chemicals, Inc.
    7 Mulliken Way
    NEWBURYPORT, MA 01950
    USA
    info@strem.com

- **Information department:** Technical Department

- **Emergency telephone number:**
  - EMERGENCY: CHEMTREC: +1 (800) 424-9300
  - During normal opening times: +1 (978) 499-1600

2 Hazard(s) identification

- **Classification of the substance or mixture**
  - GHS02 Flame
    Flam. Liq. 2  H225  Highly flammable liquid and vapor.
    Water-react. 1  H260  In contact with water releases flammable gases, which may ignite spontaneously.

  - GHS08 Health hazard
    Carc. 2  H351  Suspected of causing cancer.
    Repr. 2  H361  Suspected of damaging fertility or the unborn child.
    STOT RE 2  H373  May cause damage to organs through prolonged or repeated exposure.
    Asp. Tox. 1  H304  May be fatal if swallowed and enters airways.

  - GHS07
    Skin Irrit. 2  H315  Causes skin irritation.
    Eye Irrit. 2A  H319  Causes serious eye irritation.
    STOT SE 3  H335  May cause respiratory irritation.

- **Label elements**
  - **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).
  - **Hazard pictograms**
    - GHS02
    - GHS07
    - GHS08

- **Signal word** Danger
Trade name: 2,2,6,6-Tetramethylpiperidinylmagnesium chloride, lithium chloride complex 1.0M (18wt% ±2wt%) in toluene/tetrahydrofuran

Hazard-determining components of labeling:
Tetrahydrofuran [109-99-9]
toluene

Hazard statements
H225 Highly flammable liquid and vapor.
H260 In contact with water releases flammable gases, which may ignite spontaneously.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H351 Suspected of causing cancer.
H361 Suspected of damaging fertility or the unborn child.
H335 May cause respiratory irritation.
H363 May cause damage to organs through prolonged or repeated exposure.
H304 May be fatal if swallowed and enters airways.

Precautionary statements
P231+P232 Handle under inert gas. Protect from moisture.
P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P422 Store contents under inert gas.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Classification system:
NFPA ratings (scale 0 - 4)
Health = 2
Fire = 0
Reactivity = 0

HMIS-ratings (scale 0 - 4)
Health = *2
Fire = 0
Reactivity = 0

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients

Chemical characterization: Mixtures
Description: Mixture of the substances listed below with nonhazardous additions.

Dangerous components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>109-99-9</td>
<td>Tetrahydrofuran [109-99-9]</td>
<td>70.0%</td>
</tr>
<tr>
<td>108-88-3</td>
<td>toluene</td>
<td>12.0%</td>
</tr>
</tbody>
</table>
### 4 First-aid measures

- **Description of first aid measures**
- **General information:**
  Immediately remove any clothing soiled by the product. Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
- **After inhalation:** In case of unconsciousness place patient stably in side position for transportation.
- **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact:** Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- **After swallowing:** If symptoms persist consult doctor.
- **Information for doctor:**
  - **Most important symptoms and effects, both acute and delayed** No further relevant information available.
  - **Indication of any immediate medical attention and special treatment needed** No further relevant information available.

### 5 Fire-fighting measures

- **Extinguishing media**
- **Suitable extinguishing agents:**
  - Sand. Do not use water.
  - CO2, sand, extinguishing powder. Do not use water.
- **For safety reasons unsuitable extinguishing agents:** Water with full jet
- **Special hazards arising from the substance or mixture** No further relevant information available.
- **Advice for firefighters**
  - **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
  Wear protective equipment. Keep unprotected persons away.
- **Environmental precautions:** Prevent seepage into sewage system, workpits and cellars.
- **Methods and material for containment and cleaning up:**
  Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Dispose contaminated material as waste according to item 13. Ensure adequate ventilation. Do not flush with water or aqueous cleansing agents
- **Reference to other sections**
  - See Section 7 for information on safe handling.
  - See Section 8 for information on personal protection equipment.
  - See Section 13 for disposal information.

### 7 Handling and storage

- **Handling:** Handle under inert gas.
- **Precautions for safe handling** Open and handle receptacle with care.
- **Information about protection against explosions and fires:**
  Keep ignition sources away - Do not smoke.
Protect against electrostatic charges.

- Conditions for safe storage, including any incompatibilities
- Storage: Store contents under inert gas.
- Requirements to be met by storerooms and receptacles: Store in a cool location.
- Information about storage in one common storage facility: Not required.
- Further information about storage conditions:
  Keep receptacle tightly sealed.
  Store in cool, dry conditions in well sealed receptacles.
- Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

- Additional information about design of technical systems: No further data; see item 7.
- Control parameters

<table>
<thead>
<tr>
<th>Ingredients with limit values that require monitoring at the workplace:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>109-99-9 Tetrahydrofuran [109-99-9]</strong></td>
</tr>
<tr>
<td>PEL  Long-term value: 590 mg/m³, 200 ppm</td>
</tr>
<tr>
<td>REL  Short-term value: 735 mg/m³, 250 ppm</td>
</tr>
<tr>
<td>Long-term value: 590 mg/m³, 200 ppm</td>
</tr>
<tr>
<td>TLV  Short-term value: 295 mg/m³, 100 ppm</td>
</tr>
<tr>
<td>Long-term value: 147 mg/m³, 50 ppm</td>
</tr>
<tr>
<td>Skin  Long-term value: 590 mg/m³, 200 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>108-88-3 toluene</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL  Long-term value: 200 ppm</td>
</tr>
<tr>
<td>Ceiling limit value: 300; 500* ppm</td>
</tr>
<tr>
<td>*10-min peak per 8-hr shift</td>
</tr>
<tr>
<td>REL  Short-term value: 560 mg/m³, 150 ppm</td>
</tr>
<tr>
<td>Long-term value: 375 mg/m³, 100 ppm</td>
</tr>
<tr>
<td>TLV  Long-term value: 75 mg/m³, 20 ppm</td>
</tr>
<tr>
<td>BEI</td>
</tr>
</tbody>
</table>

- Ingredients with biological limit values:
  **109-99-9 Tetrahydrofuran [109-99-9]**

| BEI  2 mg/L                                                   |
| Medium: urine                                                |
| Time: end of shift                                          |
| Parameter: Tetrahydrofuran                                  |
Trade name: 2,2,6,6-Tetramethylpiperidinylmagnesium chloride, lithium chloride complex 1.0M (18wt% ±2wt%) in toluene/tetrahydrofuran

108-88-3 toluene

<table>
<thead>
<tr>
<th>BEI</th>
<th>0.02 mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium: blood</td>
<td></td>
</tr>
<tr>
<td>Time: prior to last shift of workweek</td>
<td></td>
</tr>
<tr>
<td>Parameter: Toluene</td>
<td></td>
</tr>
<tr>
<td>0.03 mg/L</td>
<td></td>
</tr>
<tr>
<td>Medium: urine</td>
<td></td>
</tr>
<tr>
<td>Time: end of shift</td>
<td></td>
</tr>
<tr>
<td>Parameter: Toluene</td>
<td></td>
</tr>
<tr>
<td>0.3 mg/g creatinine</td>
<td></td>
</tr>
<tr>
<td>Medium: urine</td>
<td></td>
</tr>
<tr>
<td>Time: end of shift</td>
<td></td>
</tr>
<tr>
<td>Parameter: o-Cresol with hydrolysis (background)</td>
<td></td>
</tr>
</tbody>
</table>

- **Additional information:** The lists that were valid during the creation were used as basis.

- **Exposure controls**
  - **Personal protective equipment:**
    - **General protective and hygienic measures:**
      - Keep away from foodstuffs, beverages and feed.
      - Immediately remove all soiled and contaminated clothing.
      - Wash hands before breaks and at the end of work.
      - Store protective clothing separately.
      - Avoid contact with the eyes and skin.
    - **Breathing equipment:**
      - In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
    - **Protection of hands:**
      - **Protective gloves**

      The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture. Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

- **Material of gloves**
  - The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
  - **Penetration time of glove material**
    - The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
### 9 Physical and chemical properties

<table>
<thead>
<tr>
<th>Information on basic physical and chemical properties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Information</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Appearance:</strong></td>
<td></td>
</tr>
<tr>
<td>Form: Liquid</td>
<td></td>
</tr>
<tr>
<td>Color: Brown</td>
<td></td>
</tr>
<tr>
<td>Odor: Ether-like</td>
<td></td>
</tr>
<tr>
<td>Odor threshold: Not determined.</td>
<td></td>
</tr>
<tr>
<td>pH-value: Not determined</td>
<td></td>
</tr>
<tr>
<td>Change in condition</td>
<td></td>
</tr>
<tr>
<td>Melting point/Melting range: Undetermined.</td>
<td></td>
</tr>
<tr>
<td>Boiling point/Boiling range: Undetermined.</td>
<td></td>
</tr>
<tr>
<td>Flash point: Not applicable.</td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gaseous): Not determined.</td>
<td></td>
</tr>
<tr>
<td>Ignition temperature: 230 °C (446 °F)</td>
<td></td>
</tr>
<tr>
<td>Decomposition temperature: Not determined.</td>
<td></td>
</tr>
<tr>
<td>Auto igniting: Product is not selfigniting.</td>
<td></td>
</tr>
<tr>
<td>Danger of explosion: Not determined.</td>
<td></td>
</tr>
<tr>
<td>Explosion limits:</td>
<td></td>
</tr>
<tr>
<td>Lower: 1.2 Vol %</td>
<td></td>
</tr>
<tr>
<td>Upper: 12.0 Vol %</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure at 20 °C (68 °F): 200 hPa (150 mm Hg)</td>
<td></td>
</tr>
<tr>
<td>Density: Not determined</td>
<td></td>
</tr>
<tr>
<td>Relative density: Not determined.</td>
<td></td>
</tr>
<tr>
<td>Vapor density: Not determined.</td>
<td></td>
</tr>
<tr>
<td>Evaporation rate: Not determined.</td>
<td></td>
</tr>
<tr>
<td>Solubility in / Miscibility with Water: Not miscible or difficult to mix.</td>
<td></td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water): Not determined.</td>
<td></td>
</tr>
<tr>
<td>Viscosity:</td>
<td></td>
</tr>
<tr>
<td>Dynamic: Not determined</td>
<td></td>
</tr>
<tr>
<td>Kinematic: Not determined</td>
<td></td>
</tr>
<tr>
<td>Solvent content:</td>
<td></td>
</tr>
<tr>
<td>Organic solvents: 82.0 %</td>
<td></td>
</tr>
<tr>
<td>VOC content: 82.0 %</td>
<td></td>
</tr>
<tr>
<td>820.0 g/l / 6.84 lb/gl</td>
<td></td>
</tr>
</tbody>
</table>
10 Stability and reactivity

- Reactivity: No further relevant information available.
- Chemical stability
- Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
- Possibility of hazardous reactions: No dangerous reactions known.
- Conditions to avoid: No further relevant information available.
- Incompatible materials: No further relevant information available.
- Hazardous decomposition products: No dangerous decomposition products known.

11 Toxicological information

- Information on toxicological effects
- Acute toxicity:
  - LD/LC50 values that are relevant for classification:
    | Compound                  | LD50   | LC50    |
    |----------------------------|--------|---------|
    | 109-99-9 Tetrahydrofuran   | 2500 mg/kg (rat) |         |
    | 108-88-3 Toluene           | 5000 mg/kg (rat) |         |
    |                             | 12124 mg/kg (rabbit) |         |
    |                             | 5320 mg/l (mouse) |         |
  - Primary irritant effect:
    - on the skin: Irritant to skin and mucous membranes.
    - on the eye: Irritating effect.
  - Sensitization: No sensitizing effects known.
  - Additional toxicological information:
    The product shows the following dangers according to internally approved calculation methods for preparations: Irritant.
  - Carcinogenic categories
    - IARC (International Agency for Research on Cancer)
      108-88-3 Toluene 3
    - NTP (National Toxicology Program)
      None of the ingredients is listed.
    - OSHA-Ca (Occupational Safety & Health Administration)
      None of the ingredients is listed.

12 Ecological information

- Toxicity
- Aquatic toxicity: No further relevant information available.
- Persistence and degradability: No further relevant information available.
- Behavior in environmental systems:
- Bioaccumulative potential: No further relevant information available.
Trade name: 2,2,6,6-Tetramethylpiperidinylmagnesium chloride, lithium chloride complex 1.0M (18wt% ±2wt%) in toluene/tetrahydrofuran

- Mobility in soil: No further relevant information available.
- Additional ecological information:
  - General notes: Not known to be hazardous to water.
  - Results of PBT and vPvB assessment
  - PBT: Not applicable.
  - vPvB: Not applicable.
- Other adverse effects: No further relevant information available.

13 Disposal considerations

- Waste treatment methods
  - Recommendation:
    Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
- Uncleaned packaging:
  - Recommendation: Disposal must be made according to official regulations.

14 Transport information

- UN-Number
  - DOT, IMDG, IATA: UN3399
- UN proper shipping name
  - DOT, IATA: Organometallic substance, liquid, water-reactive, flammable
  - IMDG: ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE
- Transport hazard class(es)
  - DOT
    - Class: 4.3 Substances which, in contact with water, emit flammable gases
    - Label: 4.3, 3
  - IMDG
    - Class: 4.3 Substances which, in contact with water, emit flammable gases
    - Label: 4.3/3
  - IATA
    - Class: 4.3 Substances which, in contact with water, emit flammable gases

(Contd. on page 7)
Trade name: 2,2,6,6-Tetramethylpiperidinylmagnesium chloride, lithium chloride complex 1.0M (18wt% ±2wt%) in toluene/tetrahydrofuran

4.3 (3) · Label

I · Packing group

DOT, IMDG, IATA · DOT, IMDG, IATA

No · Environmental hazards:

Marine pollutant: No · Marine pollutant:

Warning: Substances which, in contact with water, emit flammable gases · Special precautions for user

F-G,S-M · EMS Number:

D · Stowage Category

SW2 Clear of living quarters. · Stowage Code

HI Keep as dry as reasonably practicable · Handling Code

SG26 In addition: from goods of classes 2.1 and 3 when stowed on deck of a containership a minimum distance of two container spaces athwartship shall be maintained, when stowed on ro-ro ships a distance of 6 m athwartship shall be maintained. · Segregation Code

Not applicable. · Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

D · Stowage Category

SW2 Clear of living quarters. · Stowage Code

HI Keep as dry as reasonably practicable · Handling Code

SG26 In addition: from goods of classes 2.1 and 3 when stowed on deck of a containership a minimum distance of two container spaces athwartship shall be maintained, when stowed on ro-ro ships a distance of 6 m athwartship shall be maintained. · Segregation Code

SG35 Stow "separated from" acids.
Trade name: 2,2,6,6-Tetramethylpiperidinylmagnesium chloride, lithium chloride complex 1.0M (18wt% ±2wt%) in toluene/tetrahydrofuran

Chemicals known to cause developmental toxicity:
- 108-88-3 toluene

Carcinogenic categories
- EPA (Environmental Protection Agency)
  - 108-88-3 toluene II
- TLV (Threshold Limit Value established by ACGIH)
  - 108-88-3 toluene A4
- NIOSH-Ca (National Institute for Occupational Safety and Health)
  None of the ingredients is listed.

GHS label elements
- The product is classified and labeled according to the Globally Harmonized System (GHS).
- Hazard pictograms
  - GHS02
  - GHS07
  - GHS08

Signal word
- Danger

Hazard-determining components of labeling:
- Tetrahydrofuran [109-99-9]
- Toluene

Hazard statements
- H225 Highly flammable liquid and vapor.
- H260 In contact with water releases flammable gases, which may ignite spontaneously.
- H315 Causes skin irritation.
- H319 Causes serious eye irritation.
- H351 Suspected of causing cancer.
- H361 Suspected of damaging fertility or the unborn child.
- H335 May cause respiratory irritation.
- H373 May cause damage to organs through prolonged or repeated exposure.
- H304 May be fatal if swallowed and enters airways.

Precautionary statements
- P231+P232 Handle under inert gas. Protect from moisture.
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- P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- P422 Store contents under inert gas.
- P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Chemical safety assessment
- A Chemical Safety Assessment has not been carried out.
16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- **Department issuing SDS:** Technical Department.
- **Contact:** Technical Director
- **Date of preparation / last revision** 07/29/2016 / -
- **Abbreviations and acronyms:**
  - ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
  - IMDG: International Maritime Code for Dangerous Goods
  - DOT: US Department of Transportation
  - IATA: International Air Transport Association
  - ACGIH: American Conference of Governmental Industrial Hygienists
  - EINECS: European Inventory of Existing Commercial Chemical Substances
  - ELINCS: European List of Notified Chemical Substances
  - CAS: Chemical Abstracts Service (division of the American Chemical Society)
  - NFPA: National Fire Protection Association (USA)
  - HMIS: Hazardous Materials Identification System (USA)
  - VOC: Volatile Organic Compounds (USA, EU)
  - LD50: Lethal concentration, 50 percent
  - PBT: Persistent, Bioaccumulative and Toxic
  - vPvB: very Persistent and very Bioaccumulative
  - NIOSH: National Institute for Occupational Safety
  - OSHA: Occupational Safety & Health
  - TLV: Threshold Limit Value
  - REL: Recommended Exposure Limit
  - BEI: Biological Exposure Limit
  - Flam. Liq. 2: Flammable liquids, Hazard Category 2
  - Water-react. 1: Substances and Mixtures which, in contact with water, emit flammable gases, Hazard Category 1
  - Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2
  - Eye Irrit. 2A: Serious eye damage/eye irritation, Hazard Category 2A
  - Carc. 2: Carcinogenicity, Hazard Category 2
  - Repr. 2: Reproductive toxicity, Hazard Category 2
  - STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3
  - STOT RE 2: Specific target organ toxicity - Repeated exposure, Hazard Category 2
  - Asp. Tox. 1: Aspiration hazard, Hazard Category 1