1 Identification

· Product name
  · Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle
  · Item number: 19-1965

· 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.

  GHS07

  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
  · Hazard-determining components of labeling:
    Tetrahydrofuran [109-99-9]
  · Hazard statements
    H225 Highly flammable liquid and vapor.
    H260 In contact with water releases flammable gases, which may ignite spontaneously.
    H319 Causes serious eye irritation.
Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

H351 Suspected of causing cancer.
H335 May cause respiratory irritation.

Description of first aid measures

- **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+P353** 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 = 1
    - Fire = 0
    - Reactivity = 0

  - **HMIS-ratings (scale 0 - 4)***
    - Health = *1
    - 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:**
  - 109-99-9 Tetrahydrofuran [109-99-9] 76.0%
  - 54575-49-4 potassium tri-sec-butylhydroborate 24.0%

4 First-aid measures

- **Description of first aid measures**
- **General information:** Immediately remove any clothing soiled by the product.
- **After inhalation:** Supply fresh air; consult doctor in case of complaints.
- **After skin contact:** Immediately rinse with water.
- **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.
Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

- 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
- 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:
  · 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:
  · 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

Components with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>Component</th>
<th>PEL (Long-term)</th>
<th>REL (Short-term)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrahydrofuran</td>
<td>590 mg/m³, 200 ppm</td>
<td>735 mg/m³, 250 ppm</td>
</tr>
<tr>
<td></td>
<td>Long-term</td>
<td>Short-term</td>
</tr>
<tr>
<td></td>
<td>590 mg/m³, 200 ppm</td>
<td>295 mg/m³, 100 ppm</td>
</tr>
</tbody>
</table>

Skin

Ingredients with biological limit values:

<table>
<thead>
<tr>
<th>Component</th>
<th>BEI (2 mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrahydrofuran</td>
<td>2 mg/L</td>
</tr>
<tr>
<td></td>
<td>Medium: urine</td>
</tr>
<tr>
<td></td>
<td>Time: end of shift</td>
</tr>
<tr>
<td></td>
<td>Parameter: Tetrahydrofuran</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.
- Avoid contact with the eyes.
- 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

#### General Information

- **Form:** Liquid
- **Color:** Colorless
- **Odor:** Ether-like
- **Odor threshold:** Not determined.
- **pH-value:** Not determined.

#### Change in condition

- **Melting point/Melting range:** Undetermined.
- **Boiling point/Boiling range:** Undetermined.

#### Flammability (solid, gaseous)

- **Flash point:** Not applicable.
- **Explosion limits:**
  - **Lower:** 1.5 Vol %
  - **Upper:** 12.0 Vol %

#### Auto igniting

- **Ignition temperature:** 230 °C (446 °F)
- **Decomposition temperature:** Not determined.
- **Danger of explosion:** Not determined.

#### Solubility in / Miscibility with

- **Water:** Not miscible or difficult to mix.
- **Partition coefficient (n-octanol/water):** Not determined.

#### Viscosity

- **Dynamic:** Not determined.
- **Kinematic:** Not determined.

#### Solvent content

- **Organic solvents:** 76.0 %
- **VOC content:** 76.0 %
  - 760.0 g/l / 6.34 lb/gl
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:
  
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral LD50</td>
</tr>
</tbody>
</table>

  - Primary irritant effect:
    - on the skin: No irritant effect.
    - 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)
    None of the ingredients is listed.
  - 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.
  - 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.
Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

- 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 packagings:
  - 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
    - Label: 4.3 (3)

- Packing group
  - DOT, IMDG, IATA: I

- Environmental hazards:
  - Marine pollutant: No
Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

<table>
<thead>
<tr>
<th>Special precautions for user</th>
<th>Warning: Substances which, in contact with water, emit flammable gases</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS Number:</td>
<td>F-G-S-M</td>
</tr>
<tr>
<td>Stowage Category</td>
<td>D</td>
</tr>
<tr>
<td>Stowage Code</td>
<td>SW2 Clear of living quarters.</td>
</tr>
<tr>
<td>Handling Code</td>
<td>H1 Keep as dry as reasonably practicable</td>
</tr>
<tr>
<td>Segregation Code</td>
<td>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. SG35 Stow &quot;separated from&quot; acids.</td>
</tr>
</tbody>
</table>

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

- DOT
  - Quantity limitations: On passenger aircraft/rail: Forbidden
    On cargo aircraft only: 1 L

- UN "Model Regulation": UN 3399 ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTION, FLAMMABLE, 4.3 (3), I

15 Regulatory information

- Safety, health and environmental regulations/legislation specific for the substance or mixture
  - Sara
    - Section 355 (extremely hazardous substances): None of the ingredients is listed.
    - Section 313 (Specific toxic chemical listings): None of the ingredients is listed.
  - TSCA (Toxic Substances Control Act): All ingredients are listed.
  - Proposition 65
    - Chemicals known to cause cancer: None of the ingredients is listed.
    - Chemicals known to cause reproductive toxicity for females: None of the ingredients is listed.
    - Chemicals known to cause reproductive toxicity for males: None of the ingredients is listed.
    - Chemicals known to cause developmental toxicity: None of the ingredients is listed.

- Carcinogenic categories
  - EPA (Environmental Protection Agency)
    - 54575-49-4 potassium tri-sec-butylhydroborate I (oral)
Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

· TLV (Threshold Limit Value established by ACGIH)

· 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]

· Hazard statements
  H225 Highly flammable liquid and vapor.
  H260 In contact with water releases flammable gases, which may ignite spontaneously.
  H319 Causes serious eye irritation.
  H351 Suspected of causing cancer.
  H335 May cause respiratory irritation.

· Precautionary statements
  P231+P232 Handle under inert gas. Protect from moisture.
  P303+P361+P335 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.

· 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)
  LC50: Lethal concentration, 50 percent

(Contd. on page 10)
Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

LD50: Lethal dose, 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
PEL: Permissible Exposure Limit
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
Eye Irrit. 2A: Serious eye damage/eye irritation, Hazard Category 2A
Carc. 2: Carcinogenicity, Hazard Category 2
STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3