SECTION 1: Identification of the substance/mixture and of the company/undertaking

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

- 1.2 Relevant identified uses of the substance or mixture and uses advised against
  - No further relevant information available.

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

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

SECTION 2: Hazards identification

- 2.1 Classification of the substance or mixture
  - Classification according to Regulation (EC) No 1272/2008
    - GHS02 flame
      Flam. Liq. 2  H225   Highly flammable liquid and vapour.
      Water-react. 1 H260 In contact with water releases flammable gases which may ignite spontaneously.
    - GHS07
      Eye Irrit. 2  H319  Causes serious eye irritation.
      STOT SE 3  H335  May cause respiratory irritation.

- 2.2 Label elements
  - Labelling according to Regulation (EC) No 1272/2008
  - The product is classified and labelled according to the CLP regulation.
  - Hazard pictograms
    - GHS02
    - GHS07
    - GHS08

- 2.2.1 Signal word
  - Danger

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

(Contd. on page 2)
Safety data sheet
according to 1907/2006/EC, Article 31

Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

- Hazard statements
  H225 Highly flammable liquid and vapour.
  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
  P101 If medical advice is needed, have product container or label at hand.
  P102 Keep out of reach of children.
  P103 Read label before use.
  P231+P232 Handle under inert gas. Protect from moisture.
  P303+P361+P353 IF ON SKIN (or hair): Remove/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+P361+P353 IF IN NOSES: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
  P422 Store contents under inert gas.
  P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- Additional information:
  EUH019 May form explosive peroxides.

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

SECTION 3: Composition/information on ingredients

- 3.2 Chemical characterisation: Mixtures
  - Description: Mixture of substances listed below with nonhazardous additions.

- Dangerous components:

<table>
<thead>
<tr>
<th>CAS</th>
<th>EINECS</th>
<th>Chemical name</th>
<th>PBT</th>
<th>vPvB</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>54575-49-4</td>
<td>259-241-7</td>
<td>potassium tri-sec-butylborohydride</td>
<td>Flam. Liq. 2</td>
<td>Flam. Liq. 2</td>
<td>24.0%</td>
</tr>
</tbody>
</table>

- Additional information: For the wording of the listed risk phrases refer to section 16.

SECTION 4: First aid measures

- 4.1 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.

- 4.2 Most important symptoms and effects, both acute and delayed
  No further relevant information available.

- 4.3 Indication of any immediate medical attention and special treatment needed
  No further relevant information available.

(Contd. on page 3)
SECTION 5: Firefighting measures

- 5.1 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
- 5.2 Special hazards arising from the substance or mixture No further relevant information available.
- 5.3 Advice for firefighters
- Protective equipment: No special measures required.

SECTION 6: Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures
  Wear protective equipment. Keep unprotected persons away.
- 6.2 Environmental precautions: Prevent seepage into sewage system, workpits and cellars.
- 6.3 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
- 6.4 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.

SECTION 7: Handling and storage

- 7.1 Precautions for safe handling Open and handle receptacle with care.
- Information about fire - and explosion protection:
  Keep ignition sources away - Do not smoke.
  Protect against electrostatic charges.
- 7.2 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 container tightly sealed.
  Store in cool, dry conditions in well sealed receptacles.
- 7.3 Specific end use(s) No further relevant information available.

SECTION 8: Exposure controls/personal protection

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

- Ingredients with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WEL Short-term value: 300 mg/m³, 100 ppm</td>
</tr>
<tr>
<td>Long-term value: 150 mg/m³, 50 ppm</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

- Additional information: The lists valid during the making were used as basis.

8.2 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.
  - Respiratory protection:
    In case of brief exposure or low pollution use respiratory filter device.
    In case of intensive or longer exposure use self-contained respiratory protective device.
  - 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.
  - Eye protection:
    Tightly sealed goggles

9.1 Information on basic physical and chemical properties

- General Information
  - Appearance:
    Form: Liquid
    Colour: Colourless
  - Odour:
    Odour threshold: Ether-like
  - Odour threshold: Not determined.

- pH-value: Not determined.

- Change in condition
  - Melting point/Melting range: Undetermined.
  - Boiling point/Boiling range: Undetermined.
· Flash point: Not applicable.
· Flammability (solid, gaseous): Not determined.
· Ignition temperature: 230 °C
· Decomposition temperature: Not determined.
· Self-igniting: Product is not selfigniting.
· Danger of explosion: Explosive when dry.
May form explosive peroxides.
· Explosion limits:
  Lower: 1.5 Vol %
  Upper: 12.0 Vol %
· Vapour pressure at 20 °C: 200 hPa
· Density: Not determined.
· Relative density Not determined.
· Vapour density Not determined.
· Evaporation rate 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 (EC) 76.00 %
· 9.2 Other information No further relevant information available.

SECTION 10: Stability and reactivity

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

SECTION 11: Toxicological information

· 11.1 Information on toxicological effects
· Acute toxicity Based on available data, the classification criteria are not met.
· LD/LC50 values relevant for classification:
  Oral LD50 2500 mg/kg (rat)
Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

- Primary irritant effect:
  - Skin corrosion/irritation Based on available data, the classification criteria are not met.
  - Serious eye damage/irritation
    Causes serious eye irritation.
  - Respiratory or skin sensitisation Based on available data, the classification criteria are not met.
  - CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction)
  - Germ cell mutagenicity Based on available data, the classification criteria are not met.
  - Carcinogenicity
    Suspected of causing cancer.
  - Reproductive toxicity Based on available data, the classification criteria are not met.
  - STOT-single exposure
    May cause respiratory irritation.
  - STOT-repeated exposure Based on available data, the classification criteria are not met.
  - Aspiration hazard Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

- 12.1 Toxicity
  - Aquatic toxicity: No further relevant information available.
- 12.2 Persistence and degradability
  - No further relevant information available.
- 12.3 Bioaccumulative potential
  - No further relevant information available.
- 12.4 Mobility in soil
  - No further relevant information available.
- Additional ecological information:
  - General notes: Not known to be hazardous to water.
- 12.5 Results of PBT and vPvB assessment
  - PBT: Not applicable.
  - vPvB: Not applicable.
- 12.6 Other adverse effects
  - No further relevant information available.

SECTION 13: Disposal considerations

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

SECTION 14: Transport information

- 14.1 UN-Number
  - ADR, IMDG, IATA
    UN3399
- 14.2 UN proper shipping name
  - ADR
    3399 ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE
  - IMDG
    ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE
  - IATA
    Organometallic substance, liquid, water-reactive, flammable
Safety data sheet
according to 1907/2006/EC, Article 31

Printing date 29.07.2016
Revision: 29.07.2016

Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

(Contd. of page 6)

· 14.3 Transport hazard class(es)
  · ADR
  · IMDG
  · IATA

· Class
  - ADR: 4.3 Substances which, in contact with water, emit flammable gases.
  - IMDG: 4.3 Substances which, in contact with water, emit flammable gases.
  - IATA: 4.3 Substances which, in contact with water, emit flammable gases.

· Label
  - ADR: 4.3+3
  - IMDG: 4.3+3
  - IATA: 4.3 (3)

· 14.4 Packing group
  · ADR, IMDG, IATA: I

· 14.5 Environmental hazards:
  · Marine pollutant: No

· 14.6 Special precautions for user
  · EMS Number: F-G,S-M
  · Stowage Category: D
  · Stowage Code: SW2 Clear of living quarters.
  · Handling Code: H1 Keep as dry as reasonably practicable
  · Segregation 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.
  · SG35 Stow "separated from" acids.

· 14.7 Transport in bulk according to Annex II of Marpol and the IBC Code
  · Transport/Additional information:
    · ADR
    · Limited quantities (LQ): 0

(Contd. on page 8)
Trade name: Potassium tri-sec-butylborohydride, 1.0M in THF, in Sure/Seal™ bottle

(Contd. of page 7)

<table>
<thead>
<tr>
<th>Excepted quantities (EQ)</th>
<th>Code: E0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not permitted as Excepted Quantity</td>
<td></td>
</tr>
</tbody>
</table>

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

**SECTION 15: Regulatory information**

- **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
  - Directive 2012/18/EU
  - Named dangerous substances - ANNEX I None of the ingredients is listed.
  - Seveso category
    - O2: Substances and mixtures which in contact with water emit flammable gases
    - P5c: FLAMMABLE LIQUIDS
  - Qualifying quantity (tonnes) for the application of lower-tier requirements 100 t
  - Qualifying quantity (tonnes) for the application of upper-tier requirements 500 t

- **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

**SECTION 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.

- **Relevant phrases**
  - H225 Highly flammable liquid and vapour.
  - H250 Catches fire spontaneously if exposed to air.
  - H260 In contact with water releases flammable gases which may ignite spontaneously.
  - H319 Causes serious eye irritation.
  - H335 May cause respiratory irritation.
  - H351 Suspected of causing cancer.

- **Department issuing MSDS:** Technical Department.

- **Contact:** Technical Director

- **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
  - IATA: International Air Transport Association
  - GHS: Globally Harmonised System of Classification and Labelling of Chemicals
  - 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)
  - VOC: Volatile Organic Compounds (USA, EU)
  - LC50: Lethal concentration, 50 percent
  - LD50: Lethal dose, 50 percent
  - PBT: Persistent, Bioaccumulative and Toxic
  - vPvB: very Persistent and very Bioaccumulative
  - Flam. Liq. 2: Flammable liquids, Hazard Category 2
  - Pyr. Liq. 1: Pyrophoric Liquids, Hazard Category 1
  - Water-react. 1: Substances and Mixtures which, in contact with water, emit flammable gases, Hazard Category 1
  - Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2
  - Carc. 2: Carcinogenicity, Hazard Category 2
  - STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3