



# MATERIAL SAFETY DATA SHEET

according to the (US) Hazard Communication Standard (29 CFR 1910.1200)

Date of issue: 02/05/2013

Version 1.0

## SECTION 1. Identification

### Product identifier

Product number	841077
Product name	Boron hydride-tetrahydrofuran complex (stabilised) (1 molar solution in tetrahydrofuran) for synthesis

### Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Chemical for synthesis
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### Details of the supplier of the safety data sheet

Company	EMD Millipore Corporation   290 Concord Road, Billerica, MA 01821, United States of America   SDS Phone Support: +1-978-715-1335   General Inquiries: +1-978-715-4321   Monday to Friday, 9:00 AM to 4:00 PM Eastern Time (GMT-5)  e-mail: mm_sds@merckgroup.com
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Emergency telephone	800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week
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## SECTION 2. Hazards identification

### GHS Classification

Substances and mixtures which in contact with water emit flammable gases, Category 1, H260  
Flammable liquid, Category 2, H225  
Acute toxicity, Category 4, Oral, H302  
Specific target organ systemic toxicity - single exposure, Category 3, H335  
Skin irritation, Category 2, H315  
Serious eye damage, Category 1, H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

### GHS-Labeling

*Hazard pictograms*



*Signal Word*  
Danger

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## *Hazard Statements*

H225 Highly flammable liquid and vapor.  
H260 In contact with water releases flammable gases which may ignite spontaneously.  
H302 Harmful if swallowed.  
H315 Causes skin irritation.  
H318 Causes serious eye damage.  
H335 May cause respiratory irritation.

## *Precautionary Statements*

P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.  
P240 Ground/bond container and receiving equipment.  
P280 Wear eye protection.  
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.  
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P402 + P404 Store in a dry place. Store in a closed container.

## **OSHA Hazards**

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

## **Other hazards**

None known.

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## **SECTION 3. Composition/information on ingredients**

Chemical nature                      Mixture of inorganic and organic compounds

### **Hazardous ingredients**

*Chemical Name ( Concentration)*

CAS-No.

*tetrahydrofuran ( >= 90 % - <= 100 % )*

109-99-9

*borane-tetrahydrofuran complex (1:1) ( >= 5 % - < 10 % )*

14044-65-6

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## **SECTION 4. First aid measures**

### **Description of first-aid measures**

#### *Inhalation*

After inhalation: fresh air.

#### *Skin contact*

After skin contact: wash off with plenty of water. Remove contaminated clothing.

#### *Eye contact*

After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist.

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### *Ingestion*

After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

Never give anything by mouth to an unconscious person.

### **Most important symptoms and effects, both acute and delayed**

irritant effects, Cough, Shortness of breath, narcosis, Headache, drowsiness

Risk of serious damage to eyes.

The following applies to boron compounds in general: resorption is followed by nausea and vomiting, agitation<(>,<)> spasms, CNS disorders, cardiovascular disorders.

### **Indication of any immediate medical attention and special treatment needed**

No information available.

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## **SECTION 5. Fire-fighting measures**

### **Extinguishing media**

*Suitable extinguishing media*

Carbon dioxide (CO<sub>2</sub>), Dry powder

*Unsuitable extinguishing media*

Water, Foam

### **Special hazards arising from the substance or mixture**

Combustible material, Vapors are heavier than air and may spread along floors.

Forms explosive mixtures with air at ambient temperatures.

Pay attention to flashback.

Development of hazardous combustion gases or vapors possible in the event of fire.

May not get in touch with:

Water

### **Advice for firefighters**

*Special protective equipment for fire-fighters*

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

*Further information*

Prevent fire extinguishing water from contaminating surface water or the ground water system.

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## **SECTION 6. Accidental release measures**

### **Personal precautions, protective equipment and emergency procedures**

Advice for non-emergency personnel: Avoid substance contact. Do not breathe vapors, aerosols. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.

Advice for emergency responders: Protective equipment see section 8.

### **Environmental precautions**

Do not empty into drains. Risk of explosion.

### **Methods and materials for containment and cleaning up**

Cover drains. Collect, bind, and pump off spills.

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Observe possible material restrictions (see sections 7 and 10).  
Take up with liquid-absorbent material (e.g. Chemisorb®). Dispose of properly. Clean up affected area.

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## SECTION 7. Handling and storage

### Precautions for safe handling

Keep workplace dry. Do not allow product to come into contact with water.

Observe label precautions.

#### *Advice on protection against fire and explosion*

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

### Conditions for safe storage, including any incompatibilities

Protective gas: Argon. Tightly closed. Keep away from heat and sources of ignition.

Store below +15°C (+59°F).

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## SECTION 8. Exposure controls/personal protection

### Exposure limit(s)

#### *Ingredients*

Basis	Value	Threshold limits	Remarks
<i>tetrahydrofuran</i>	<i>109-99-9</i>		
ACGIH	Time Weighted Average (TWA): Skin designation:	50 ppm	Can be absorbed through the skin.
	Short Term Exposure Limit (STEL):	100 ppm	
NIOSH/GUIDE	Recommended exposure limit (REL):	200 ppm 590 mg/m <sup>3</sup>	
	Short Term Exposure Limit (STEL):	250 ppm 735 mg/m <sup>3</sup>	
OSHA_TRANS	PEL:	200 ppm 590 mg/m <sup>3</sup>	
Z1A	Short Term Exposure Limit (STEL):	250 ppm 735 mg/m <sup>3</sup>	
	Time Weighted Average (TWA):	200 ppm 590 mg/m <sup>3</sup>	

### Engineering measures

Technical measures and appropriate working operations should be given priority over the use of personal protective equipment.

### Individual protection measures

Protective clothing should be selected specifically for the workplace, depending on concentration and quantity of the hazardous substances handled. The chemical resistance of the protective equipment should be inquired at the respective supplier.

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### *Hygiene measures*

Immediately change contaminated clothing. Apply skin- protective barrier cream. Wash hands and face after working with substance.

### *Eye/face protection*

Safety glasses

### *Hand protection*

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

### *Other protective equipment:*

Flame retardant antistatic protective clothing

### *Respiratory protection*

required when vapors/aerosols are generated.

Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

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## **SECTION 9. Physical and chemical properties**

Physical state	liquid
Color	colorless
Odor	unpleasant
Odor Threshold	No information available.
pH	No information available.
Melting point	No information available.
Boiling point/boiling range	151 °F ( 66 °C) at 1,013 hPa (THF)
Flash point	-7.1 °F ( -21.7 °C)
Evaporation rate	No information available.
Flammability (solid, gas)	No information available.
Lower explosion limit	1.58 %(V)
Upper explosion limit	12.42 %(V)
Vapor pressure	No information available.
Relative vapor density	No information available.

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Relative density	0.876 g/cm <sup>3</sup> at 77 °F ( 25 °C)
Water solubility	Risk of violent reaction.
Partition coefficient: n-octanol/water	No information available.
Autoignition temperature	No information available.
Decomposition temperature	No information available.
Viscosity, dynamic	No information available.
Explosive properties	No information available.
Ignition temperature	217 °F ( 103 °C)

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## SECTION 10. Stability and reactivity

### Reactivity

Vapors may form explosive mixture with air.

### Chemical stability

Sensitivity to light  
Sensitive to air.

### *Stabilizer*

sodium borohydride

### Possibility of hazardous reactions

Risk of ignition or formation of inflammable gases or vapors with:

Violent reactions possible with:

Water, Alcohols, Acid chlorides, Acid anhydrides, Strong oxidizing agents, acids, Air

### Conditions to avoid

Warming.

A range from approx. 15 Kelvin below the flash point is to be rated as critical.

Exposure to moisture.

Exposure to air.

May readily catch fire after brief contact with a source of ignition.

### Incompatible materials

rubber, various plastics, Tin

### Hazardous decomposition products

Peroxides

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Product number

841077

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## SECTION 11. Toxicological information

### Information on toxicological effects

#### *Likely route of exposure*

Eye contact, Skin contact

#### *Target Organs*

Eyes

Respiratory system

Central nervous system

#### *Acute oral toxicity*

LD50 rat: > 500 - 2,000 mg/kg

OECD Test Guideline 423

Symptoms: Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.

#### *Acute inhalation toxicity*

Symptoms: mucosal irritations, Cough, Shortness of breath

#### *Acute dermal toxicity*

absorption

#### *Skin irritation*

Irritations

Drying-out effect resulting in rough and chapped skin.

#### *Eye irritation*

Irritations

Risk of serious damage to eyes.

#### *Specific target organ systemic toxicity - single exposure*

The substance or mixture is not classified as specific target organ toxicant, single exposure.

#### *Specific target organ systemic toxicity - repeated exposure*

The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

#### *Aspiration hazard*

Regarding the available data the classification criteria are not fulfilled.

### Carcinogenicity

IARC

No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA

No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

NTP

No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen

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ACGIH

by NTP.  
Confirmed animal carcinogen with unknown relevance to humans.  
tetrahydrofuran 109-99-9

## Further information

Further toxicological data:

After uptake:

Headache

In high doses:

drowsiness, narcosis

Other information

The following applies to boron compounds in general: resorption is followed by nausea and vomiting, agitation(>,<)> spasms, CNS disorders, cardiovascular disorders.

Further data:

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

## Ingredients

### *tetrahydrofuran*

#### *Acute oral toxicity*

LD50 rat: 1,650 mg/kg (RTECS) (Regulation (EC) No 1272/2008, Annex VI)

#### *Acute inhalation toxicity*

LC50 rat: 53.9 mg/l; 4 h (IUCLID)

#### *Skin irritation*

rabbit

Result: Irritations

(IUCLID) (Regulation (EC) No 1272/2008, Annex VI)

#### *Eye irritation*

rabbit

Result: Eye irritation

(IUCLID)

#### *Sensitization*

Sensitization test: guinea pig

Result: negative

(IUCLID)

Human experience

Result: negative

(IUCLID)

#### *Germ cell mutagenicity*

##### *Genotoxicity in vitro*

Ames test

Result: negative

(IUCLID)

#### *Reproductive toxicity*

No impairment of reproductive performance suspected. (Lit.)

*borane-tetrahydrofuran complex (1:1)*



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No information available.

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## SECTION 12. Ecological information

### Ecotoxicity

No information available.

### Persistence and degradability

No information available.

### Bioaccumulative potential

No information available.

### Mobility in soil

No information available.

### Other adverse effects

#### *Additional ecological information*

Further information on ecology

Discharge into the environment must be avoided.

### Ingredients

#### *tetrahydrofuran*

##### *Toxicity to fish*

LC50 Pimephales promelas (fathead minnow): 2,160 mg/l; 96 h (in soft water) (IUCLID)

##### *Toxicity to daphnia and other aquatic invertebrates*

EC50 Daphnia magna (Water flea): 382 mg/l; 24 h (IUCLID)

##### *Toxicity to algae*

IC50 Scenedesmus quadricauda (Green algae): 3,700 mg/l; 8 d (maximum permissible toxic concentration) (IUCLID)

##### *Toxicity to bacteria*

EC5 Pseudomonas putida: 580 mg/l; 16 h (maximum permissible toxic concentration) (IUCLID)

##### *Biodegradability*

39 %; 28 d

OECD Test Guideline 301D

Not readily biodegradable.

Substance does not meet the criteria for PBT or vPvB according to Regulation (EC) No 1907/2006, Annex XIII.

#### *borane-tetrahydrofuran complex (1:1)*

No information available.

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## SECTION 13. Disposal considerations

The information presented only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. Disposal should be in accordance with applicable regional, national and local laws and regulations.

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## SECTION 14. Transport information

### Land transport (DOT)

UN number UN 3148  
Proper shipping name WATER-REACTIVE LIQUID, N.O.S. ( BORANE TETRAHYDROFURAN COMPLEX)  
Class 4.3  
Packing group I  
Environmentally hazardous --

### Air transport (IATA)

UN number UN 3148  
Proper shipping name WATER-REACTIVE LIQUID, N.O.S. ( BORANE TETRAHYDROFURAN COMPLEX)  
Class 4.3  
Packing group I  
Environmentally hazardous --  
Special precautions for user yes  
IATA ( Passenger) **Not permitted for transport**

### Sea transport (IMDG)

UN number UN 3148  
Proper shipping name WATER-REACTIVE LIQUID, N.O.S. ( BORANE TETRAHYDROFURAN COMPLEX)  
Class 4.3  
Packing group I  
Environmentally hazardous --  
Special precautions for user yes  
EmS F-G S-N

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## SECTION 15. Regulatory information

### United States of America

#### OSHA Hazards

Flammable Liquid  
Water Reactive  
Toxic by ingestion  
Target organ effects  
Skin irritant  
Corrosive to eyes  
Respiratory irritant  
Carcinogen

This information is based on 29 CFR 1910.1200 criteria prior to adoption of the GHS, and may deviate from the GHS information on the label and in section 2.

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## SARA 311/312 Hazards

Fire Hazard

Reactivity Hazard

Acute Health Hazard

Chronic Health Hazard

## SARA 313

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

## SARA 302

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

## Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.

This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.

## Massachusetts Right To Know

*Ingredients*

tetrahydrofuran

## Pennsylvania Right To Know

*Ingredients*

tetrahydrofuran

borane-tetrahydrofuran complex (1:1)

## New Jersey Right To Know

*Ingredients*

tetrahydrofuran

borane-tetrahydrofuran complex (1:1)

## Notification status

TSCA:

On TSCA Inventory

DSL:

This product contains one or several components listed in the Canadian NDSL.

*Ingredients*

borane-tetrahydrofuran complex (1:1)

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## SECTION 16. Other information

### Training advice

Provide adequate information, instruction and training for operators.

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## Full text of H-Statements referred to under sections 2 and 3.

H225	Highly flammable liquid and vapor.
H260	In contact with water releases flammable gases which may ignite spontaneously.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

## Key or legend to abbreviations and acronyms used in the safety data sheet

Used abbreviations and acronyms can be looked up at [www.wikipedia.org](http://www.wikipedia.org).

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The information contained herein is based on the present state of our knowledge. It characterizes the product with regard to appropriate safety precautions. It does not represent a warranty of any product properties and we assume no liability for any loss or injury which may result from the use of this information. Users should conduct their own investigations to determine the suitability of the information.

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