

**MATERIAL SAFETY DATA SHEET (MSDS)**  
**according to Regulation (EC) No. 1907/2006**  
**Version 4.0 Revision Date 01.06.2015**


## 1.0 Identification of the substance/preparation and of the company/enterprise

- 1.1 Product identifiers** : Borane-tetrahydrofuran complex  
 1.0 M (molar) solution in tetrahydrofuran
- EINECS** : 237-881-8  
**CAS** : 14044-65-6  
**RTECS** : not available
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**  
 A highly selective reducer of aldehydes, ketones and carboxylic acids to alcohols. Used in hydroboration reactions.
- 1.3 Details of the supplier of the safety data sheet**  
 JSC AVIABOR, Nizhny Novgorod Region  
 606000 Dzerzhinsk, Russia  
 Tel: (+7)-8313-249 727, Fax: (+7)-8313-249 767  
 Only Representative - Espace Chemicals GmbH  
 Tel: +49(0) 30 896779290 – 0, Fax: + 49(0) 30 896779290 - 1
- 1.4 Emergency telephone number** (+7)-8313-249 750/ 630

## 2.0 Hazard Identification

- 2.1 Classification of the substance or mixture**  
 A clear colourless liquid. Sensitive to moisture. Toxic if swallowed and inhaled. Irritating to eyes. No manipulations with the product are allowed until precautions recommended by the manufacturer are read and understood.

**Regulation (EC) No 1272/2008 Annex VI Table**

Classification		Labelling		
Hazard Class and Category Code(s)	Hazard Statement Code(s)	Pictogram Signal Word Code(s)	Hazard Statement Code(s)	Suppl. Hazard statement code(s)
Flam. Liq. Cat.2	H225		H225	EUH019
Water-react. Cat.1	H260		H260	
Acute Tox.Oral. Cat.4	H302		H302	
Skin Irrit. Cat.2	H315		H315	
Eye Dam. Cat.1	H318		H318	
Carc.Cat.2	H351		H351	
STOT SE Cat.3	H335		H335	
		Danger		

### 2.2 Label elements

**Hazard Statement(s):**

- H225 Highly flammable liquid and vapour  
 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

H351	Suspected of causing cancer.
H335	May cause respiratory irritation
EUH019	May form explosive peroxides

**Precautionary statement(s):**

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P422	Store contents under inert gas.

**3.0 Composition / information on ingredients**

<b>Borane-tetrahydrofuran complex</b>	<b>1.0 M solution in tetrahydrofuran</b>
Trade names/Synonyms	tetrahydrofuran borane
EINECS	237-881-8
CAS	14044-65-6
Chemical formula	C <sub>4</sub> H <sub>11</sub> BO
Molar mass	85.94 g/mole
Classification	Flam. Liq. 2; Water-react. 1; Skin Irrit. 2; Eye Irrit. 2; H225, H260, H315, H318
<b>Tetrahydrofuran</b>	
EINECS	203-726-8
CAS	109-99-9
Index no.	603-025-00-0
Chemical formula	C <sub>4</sub> H <sub>8</sub> O
Molar mass	72.1 g/mole
Classification	Flam. Liq. 2; Eye Irrit. 2; Carc. 2; STOT SE 3; H225, H318, H335, H351, EUH019

**4.0 First Aid Measures****4.1 Description of first aid measures****After skin contact**

Immediately wash off the affected skin area with plenty of a diluted ammonia solution (~1%) with a subsequent washing by water.

**After eyes contact**

Rinse out the eyes with plenty of water with the eyelids wide open. Immediately summon an eye-specialist.

**After ingestion**

Make victim drink plenty of water, induce vomiting. Consult a doctor immediately.

**After inhalation**

Remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Urgent admission to a hospital.

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

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**4.3 Indication of immediate medical attention and special treatment needed**

no data available

**5.0 Fire Fighting Measures****5.1 Extinguishing media****Suitable extinguishing media**

Powder extinguisher, inert gas.

**Unsuitable extinguishing media**

Water, foam, carbon dioxide.

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

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

**5.3 Precautions for fire-fighters**

Full protective clothing including protective gloves and boots. For respiratory protection wear a self-contained breathing apparatus operated in a positive-pressure mode.

**5.4 Further information**

no data available

**6.0 Accidental Release Measures**

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

Suitable protective clothing.

**6.2 Environmental precautions**

Do not allow to enter sewerage system.

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

Cover with sand, place to air-proof containers, decompose with a mixture (1:1) of isopropyl alcohol and send for fire treatment.

Handle in compliance with all local, state and federal laws and regulations.

**6.4 Reference to other sections**

For disposal see section 13.

**7.0 Handling and Storage**

**7.1 Precautions for safe handling**

Eating, drinking, smoking as well as keeping of foods in a workroom is forbidden.

**7.2 Conditions for safe storage, including any incompatibilities**

Borane-tetrahydrofuran complex is stored in tightly closed containers, in inert gas atmosphere excluding any contact with air and moisture at a temperature 0 - 4 °C in a well-ventilated place. Do not store with heavy metals compounds, oxidizing and acid substances.

**7.3 Specific end uses** : no data available

**8.0 Exposure Control and Personal Protection**

**8.1 Control parameters**

**Components with workplace control parameters**

**8.2 Exposure controls**

Refer to section 7.

**Personal protective equipment**

**Normal use & handling**

Respiratory - breathing mask

Hand protection - rubber gloves

Eye protection - closely fitting goggles

Skin protection - protective clothing

**Emergency handling**

Full protective clothing, including gloves and boots, a breathing mask.

**Exposure limits**

No data available.

**Engineering controls**

A leakproof system, packless valves, welded piping and other leakproof construction.

**Industrial hygiene**

During processing ensure efficient exhaust ventilation in the working area. Keep working clothes separate. Wash hands before breaks of the work and after working with the substance. Change contaminated or soaked clothes. Regularly send the clothes to laundry. Shower after work is obligatory.

**9.0 Physical and Chemical Properties**

**9.1 Information on basic physical and chemical properties**

**Appearance**

Form : clear liquid  
 Odour : specific  
 Colour : colourless liquid

**Safety Related Information**

pH : no data available  
 Boiling point : 65.5-66.5 °C  
 Flash point : – 17 °C  
 Flammability : no data available  
 Oxidizing properties : no data available  
 Explosive properties : no data available  
 Lower limit of the melting range: no data available  
 Vapour pressure : no data available  
 Partition coefficient : no data available  
 Viscosity : no data available  
 Vapor density : no data available  
 Density : 0.898 g/cm<sup>3</sup> at 25 °C  
 Bulk density : no data available  
 Decomposition temp : no data available  
 Surface tension : no data available  
 Conductivity : no data available  
 Enthalpy of Vaporization : no data available  
 Solubility in water : hydrolyzes  
 Solubility : no data available

**9.2 Other safety information**

Ignition temperature : 103 °C  
 Melting point : not applicable

**10.0 Stability and Reactivity****10.1 Reactivity**

no data available

**10.2 Chemical stability**

Borane-tetrahydrofuran complex is stable when stored in tightly-closed containers in inert gas atmosphere at temperatures about 0 °C upon stabilization with < 0.005M sodium borohydride.

**10.3 Possibility of hazardous reactions**

Reacts with water.

**10.4 Conditions to avoid**

see Section 7

**10.5 Incompatible materials**

strong acids, oxidizing agents, moisture

**10.6 Hazardous decomposition products**

boric acid, tetrahydrofuran, hydrogen

**11.0 Toxicological Information****11.1 Information on toxicological effects****Acute toxicity**

No data available

**Skin corrosion/irritation**

No data available

**Serious eye damage/eye irritation**

No data available

**Respiratory or skin sensitization**

No data available

**Germ cell mutagenicity**

No data available

**Carcinogenicity**

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

**Reproductive toxicity**

No data available

**Specific target organ toxicity – single exposure**

No data available

**Specific target organ toxicity – repeated exposure**

No data available

**Aspiration hazard**

No data available

**Potential health effects**

**Inhalation** May be harmful if inhaled. Causes respiratory tract irritation.

**Ingestion** Harmful if swallowed.

**Skin** May be harmful if absorbed through skin. Causes skin irritation.

**Eyes** Causes eye burns.

**Additional Information**

RTECS: no data available

**12.0 Ecological Information**

**12.1 Toxicity** : no data available

**12.2 Persistence and degradability** : no data available

**12.3 Bioaccumulative potential** : no data available

**12.4 Mobility in soil** : no data available

**12.5 Results of PBT and vPvB assessment**

no data available

**12.6 Other adverse effects**

no data available

**13.0 Disposal Consideration****13.1 Waste treatment methods****Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**

Dispose of as unused product.

**14.0 Transport Information****14.1 UN-Number**

3399

**14.2 UN proper shipping name**

Organometallic substance, liquid, water-reactive, flammable (Borane-tetrahydrofuran complex)

**14.3 Transport hazard class(es)**

GGVS/GGVE/ADR/RID: 4.3, Hazard Identification: X323, Classification: WF1, Tunnel Code: (B/E)

IMO/GGVSee: 4.3(3), MFAG: 4.2, EmS: F-G, S-N, Stowage category: E

ICAO/IATA: 4.3(3), PAX: F, CAO: 494

**14.4 Packaging group**

GGVS/GGVE/ADR/RID: I                      IMO/GGVSee: I                      ICAO/IATA: I

**14.5 Environmental hazards**

GGVS/GGVE/ADR/RID: No                      IMO/GGVSee: No                      ICAO/IATA: No

**14.6 Special precautions for user**

See section 7.0

**14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**

The substance is not intended to be transported in bulk.

**15.0 Regulatory Information****15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

no data available

**15.2 Chemical Safety Assessment**

no data available

**16.0 Other Information**

This information is to the best of Aviabor's current knowledge and is intended to describe the product only in terms of health and safety and environmental requirements. Since the conditions of use are outside our control, any recommendations or suggestions are made without guarantee and we disclaim any liability for loss or damage suffered from use of this information. Customers must satisfy themselves that the product is suitable for a particular purpose. Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing patents. The data does not signify any warranty with regards to the product properties.