

## Safety data sheet Boron trifluoride

Creation date : 28.01.2005  
Revision date : 09.08.2011

Version : 1.2

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

#### 1.1. Product identifier

**Product name**  
Boron trifluoride

EC No (from EINECS): 231-569-5  
CAS No: 7637-07-2  
Index-Nr. 005-001-00-X

**Chemical formula** BF<sub>3</sub>  
**REACH Registration number:**  
Not available.

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

**Relevant identified uses**  
Industrial and professional. Perform risk assessment prior to use.  
**Uses advised against**  
Consumer use.

#### 1.3. Details of the supplier of the safety data sheet

**Company identification**  
BOC, PO Box 1201, Bluebell, Dublin  
**E-Mail Address** ReachSDS@boc.com

#### 1.4. Emergency telephone number

**Emergency phone numbers (24h):** 1850 333 435

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

##### Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)

Press. Gas (Liquefied gas) - Contains gas under pressure; may explode if heated.  
Acute Tox. 2 - Fatal if inhaled.  
Skin Corr. 1A - Causes severe skin burns and eye damage.  
Eye Dam. 1 - Causes serious eye damage.  
STOT RE 2 - May cause damage to organs through prolonged or repeated exposure.  
EUH014 - Reacts violently with water.  
EUH071 - Corrosive to the respiratory tract.

##### Classification acc. to Directive 67/548/EEC & 1999/45/EC

R14 | T+; R26 | C; R35  
Reacts violently with water.  
Very toxic by inhalation.  
Causes severe burns (eyes, respiratory system and skin).  
**Risk advice to man and the environment**  
Liquefied gas.

#### 2.2. Label elements

##### - Labelling Pictograms



##### - Signal word

Danger

##### - Hazard Statements

H280  
Contains gas under pressure; may explode if heated.

H330  
H314  
H373  
EUH014  
EUH071

Fatal if inhaled.  
Causes severe skin burns and eye damage.  
May cause damage to organs through prolonged or repeated exposure.  
Reacts violently with water.  
Corrosive to the respiratory tract.

#### - Precautionary Statements

##### Precautionary Statement Prevention

P260 Do not breathe gas, vapours.  
P280 Wear protective gloves/protective clothing/eye protection/face protection.

##### Precautionary Statement Response

P304+P340+P315 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice/attention.  
P303+P361+P353+P315 IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothes. Rinse skin with water/shower. Get immediate medical advice/attention.  
P305+P351+P338+P315 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.  
P308 + P313 IF exposed or concerned: Get medical advice/attention.

##### Precautionary Statement Storage

P403 Store in a well-ventilated place.  
P405 Store locked up.

##### Precautionary Statement Disposal

None.

#### 2.3. Other hazards

Contact with liquid may cause cold burns/frost bite.

### SECTION 3: Composition/information on ingredients

**Substance / Mixture:** Substance.

#### 3.1. Substances

Boron trifluoride  
**CAS No:** 7637-07-2  
**Index-Nr.:** 005-001-00-X  
**EC No (from EINECS):** 231-569-5  
**REACH Registration number:**  
Not available.

Contains no other components or impurities which will influence the classification of the product.

#### 3.2. Mixtures

Not applicable.

### SECTION 4: First aid measures

#### 4.1. Description of first aid measures

##### First Aid General Information:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

##### First Aid Inhalation:

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Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

#### First Aid Skin / Eye:

May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. For liquid spillage - flush with water for at least 15 minutes. In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance. In case of skin contact, wearing rubber gloves rub 2.5% calcium gluconate gel continuously into the affected area for 1.5 hours or until further medical care is available. Immediately flush eyes thoroughly with water for at least 15 minutes. Alternatively irrigate eyes intermittently for 20 minutes with an aqueous Calcium gluconate 1% solution if available.

#### First Aid Ingestion:

Ingestion is not considered a potential route of exposure.

#### 4.2. Most important symptoms and effects, both acute and delayed

May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Delayed adverse effects possible. May result in pulmonary oedema.

#### 4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance. Treat with a corticosteroid spray as soon as possible after inhalation. Recommendations to physicians: Provide oxygen.

### SECTION 5: Fire fighting measures

#### 5.1. Extinguishing media

##### Suitable extinguishing media

Water fog. Carbon dioxide. Foam. Dry powder. Use water spray or fog to control fire fumes.

##### Unsuitable extinguishing media

Do not use a solid water stream.

#### 5.2. Special hazards arising from the substance or mixture

##### Specific hazards

Exposure to fire may cause containers to rupture/explode.

##### Hazardous combustion products

None that are more toxic than the product itself.

#### 5.3. Advice for fire-fighters

##### Specific methods

If possible, stop flow of product. Move container away or cool with water from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.

##### Special protective equipment for fire-fighters

Gas tight chemically protective clothing (Type 1) in combination with self contained breathing apparatus.

##### Guideline:

EN 943-2:2002: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET).

### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Use self-contained breathing apparatus and chemically protective clothing. Ensure adequate air ventilation. Monitor concentration of released product. Prevent from entering sewers, basements and workpits, or any place where its

accumulation can be dangerous. EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.

#### 6.2. Environmental precautions

Try to stop release. Reduce vapour with fog or fine water spray.

#### 6.3. Methods and material for containment and cleaning up

Ventilate area. Hose down area with water. Wash contaminated equipment or sites of leaks with copious quantities of water.

#### 6.4. Reference to other sections

See also sections 8 and 13.

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

Only experienced and properly instructed persons should handle gases under pressure. The substance must be handled in accordance with good industrial hygiene and safety procedures. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Avoid exposure, obtain special instructions before use. Do not smoke while handling product. Ensure the complete gas system has been (or is regularly) checked for leaks before use. Installation of a cross purge assembly between the container and the regulator is recommended. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Avoid suckback of water, acid and alkalis. Refer to supplier's handling instructions. Do not allow backfeed into the container. Protect containers from physical damage; do not drag, roll, slide or drop. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminates particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the container contents.

#### 7.2. Conditions for safe storage, including any incompatibilities

Keep container below 50°C in a well ventilated place. Cylinders should be stored in the vertical position and properly secured to prevent falling over. Secure cylinders to prevent them from falling. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion.

#### 7.3. Specific end use(s)

None.

### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

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#### Exposure limit value

Value type	value	Note
TLV (ACGIH)	1 ppm	ACGIH 1995 - 1996

#### Derived No Effect Levels

Type	Exposure	Value	Population	Effects
DNEL	Short term inhalation	5 mg/m <sup>3</sup>	Workers	Systemic
DNEL	Short term inhalation	5 mg/m <sup>3</sup>	Workers	Local
DNEL	Long term inhalation	1 mg/m <sup>3</sup>	Workers	Systemic
DNEL	Long term inhalation	1 mg/m <sup>3</sup>	Workers	Local

#### Predicted No Effect Concentrations

Type	Environmental Compartment	Value
PNEC	Fresh water	1,9 mg/l
PNEC	Marine	0,6 mg/l
PNEC	Intermittent release	1,25 mg/l
PNEC	STP (Sewage Treatment Plant)	10 mg/l
PNEC	Fresh water sediment	2,6 mg/kg dw
PNEC	Marine water sediment	1,92 mg/kg dw

## 8.2. Exposure controls

### Appropriate engineering controls

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Product to be handled in a closed system and under strictly controlled conditions. Keep concentrations well below occupational exposure limits. Preferably use permanent leak-tight connections (eg. welded pipes). Gas detectors should be used when toxic quantities may be released. Provide adequate general or local ventilation. Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages.

### Personal protective equipment

#### Eye and face protection

Protect eyes, face and skin from liquid splashes. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Wear eye protection to EN 166 when using gases. Wear a face-shield when transfilling and breaking transfer connections. Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Full-face mask recommended

Guideline:

EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking

#### Skin protection

##### Hand protection

Advice: Wear cold insulating gloves.

Guideline: EN 511 Protective gloves against cold.

Advice: Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Material: Neoprene

Advice: Wear working gloves and safety shoes while handling containers.

#### Body protection

Protect eyes, face and skin from contact with product. Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

Guideline:

EN 943: Protective clothing against liquid and gaseous chemicals, including liquid aerosols and solid particles.

#### Other protection

Wear working gloves and safety shoes while handling containers. ISO 20345 Safety footwear.

#### Respiratory protection

Keep self contained breathing apparatus readily available for emergency use., Use SCBA in the event of high concentrations, The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD., When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used.

Guideline:

EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking

For short term use:

Material:

Filter A2B2

Guideline:

EN 14387: Respiratory protective devices. Gas filter(s) and combined filter(s). Requirements, testing, marking

For long term use:, When allowed by a risk assessment a supplied air respirator may be used.

Guideline:

EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.

#### Thermal hazards

If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.

#### Environmental Exposure Controls

Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

#### General information

**Appearance/Colour:** Colourless gas. Gives off white fumes in moist air.

**Odour:** Pungent

**Odour threshold:**

Odour threshold is subjective and inadequate to warn for over exposure.

**pH value:** If dissolved in water pH-value will be affected.

**Melting point:** -129 °C

**Boiling point:** -100 °C

**Flash point:** Not applicable for gases and gas mixtures.

**Evaporation rate:**

Not applicable for gases and gas mixtures.

**Flammability range:** Non flammable.

**Vapour Pressure 20 °C:** Not applicable.

**Relative density, gas:** 2,4

**Solubility in water:** 3280 mg/l

**Partition coefficient: n-octanol/water:**

Not applicable.

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**Autoignition temperature:** Not applicable.

**Viscosity:**

Dynamic: 0,017 mPa.s

**Molecular weight:** 68 g/mol

**Critical temperature:** -12,2 °C

**Relative density, liquid:** 1,6

### 9.2. Other information

Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Unreactive under normal conditions.

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

Reacts violently with water.

### 10.4. Conditions to avoid

Avoid moisture in installation systems.

### 10.5. Incompatible materials

Moisture. Reacts with most metals in the presence of moisture, liberating hydrogen, an extremely flammable gas. With water causes rapid corrosion of some metals. May react violently with alkalis. For material compatibility see latest version of ISO-11114.

### 10.6. Hazardous decomposition products

None that are more toxic than the product itself. Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

**Acute oral toxicity**

Value: LD50

Species: Rat

Value in standard unit mg/kg: 320 mg/kg

**Acute inhalation toxicity**

Value: LC50

Species: Rat

Exposure time: 4 h

Value in non-standard unit: 194 ppm

Value: LC50

Species: Rat

Exposure time: 1 h

Value in non-standard unit: 387 ppm

**Acute dermal toxicity**

Method: OECD Guideline 402 (Acute Dermal Toxicity).

Study scientifically unjustified.

**Skin irritation**

Species: Rabbit

Severe corrosion to the skin at high concentrations.

**Eye irritation**

Severe corrosion to the eyes at high concentrations.

**Sensitization**

No known effects from this product.

**Repeated dose toxicity**

Species: Rat

Route of application: Inhalation

Value type: NOAEL

Value: 6 mg/m<sup>3</sup>

Method: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day).

Kidneys

Species: Rat

Route of application: Inhalation

Value type: LOAEL

Value: 17 mg/m<sup>3</sup>

Method: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day).

Kidneys

**Genetic toxicity in vitro**

Negative.

**Genetic toxicity in vivo**

Result: Study planned

**Assessment mutagenicity**

No known effects from this product.

**Assessment carcinogenicity**

No known effects from this product.

**Assessment toxicity to reproduction**

No data available.

**Other relevant toxicity information**

Risk of serious health injuries in case of long term exposure.,

Inhalation can cause damage to respiratory tract and lungs.,

Irritation of respiratory tract., Pulmonary damage is possible, Renal

damage is possible., Irritates mucous membranes

**Experiences with human exposure**

May result in pulmonary oedema.

Absorption of excessive F- can result in acute systemic fluorosis with hypocalcemia interference with various metabolic functions and organ damage (heart, liver, kidneys).

Death from respiratory tract damage would likely occur before significant amounts of fluoride are absorbed.

**Specific Target Organ Toxicity (STOT) - Single Exposure**

Organ: Kidneys

Organ: Liver

Organ: Heart

Organ: Lungs

Severe corrosion to the respiratory tract at high concentrations.

**Specific Target Organ Toxicity (STOT) - Repeated Exposure**

Organ: Heart

Organ: Kidneys

Organ: Liver

Organ: Lungs

Severe corrosion to the respiratory tract at high concentrations.

**Aspiration hazard**

Not applicable to gases and gas mixtures

## SECTION 12: Ecological information

### 12.1. Toxicity

Toxic to water organisms., Avoid release to the environment., Product is not allowed to be discharged into ground water or aquatic environment

**Acute and prolonged toxicity fish**

Species: Ide (Leuciscus idus)

Exposure time: 96 h

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Value type: LC50  
Value in standard unit mg/l: 22 - 46 mg/l  
**Acute toxicity aquatic invertebrates**  
Species: Water flea (Daphnia magna)  
Exposure time: 48 h  
Value type: EC50  
Value in standard unit mg/l: 21,3 mg/l

**12.2. Persistence and degradability**  
Not readily biodegradable. Inorganic compound.

**12.3. Bioaccumulative potential**  
No data available.  
**Biological oxygen demand (BOD)**  
Not determined  
**Chemical oxygen demand (COD)**  
Not determined

**12.4. Mobility in soil**  
No data available.

**12.5. Results of PBT and vPvB assessment**  
No data available.

**12.6. Other adverse effects**  
May cause pH changes in aqueous ecological systems.

### SECTION 13: Disposal considerations

**13.1. Waste treatment methods**  
Do not discharge into any place where its accumulation could be dangerous. Must not be discharged to atmosphere. Gas may be scrubbed in alkaline solution under controlled conditions to avoid violent reaction. Contact supplier if guidance is required. Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org>) for more guidance on suitable disposal methods.  
Gases in pressure containers (including halons) containing dangerous substances  
**EWC Nr. 16 05 04\***

### SECTION 14: Transport information

#### ADR/RID

**14.1. UN number**  
1008

**14.2. UN proper shipping name**  
Boron Trifluoride

**14.3. Transport hazard class(es)**  
Class: 2  
Classification Code: 2TC  
Labels: 2.3, 8  
Hazard number: 268  
Tunnel restriction code: (C/D)  
Emergency Action Code: 2RE

**14.4. Packing group (Packing Instruction)**  
P200

**14.5. Environmental hazards**  
None.

**14.6. Special precautions for user**  
None.

#### IMDG

**14.1. UN number**  
1008

**14.2. UN proper shipping name**  
Boron Trifluoride

**14.3. Transport hazard class(es)**  
Class: 2.3  
Labels: 2.3, 8  
EmS: FC, SU,

**14.4. Packing group (Packing Instruction)**  
P200

**14.5. Environmental hazards**  
None.

**14.6. Special precautions for user**  
None.

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

#### IATA

**14.5. Environmental hazards**  
None.

**14.6. Special precautions for user**  
None.

#### Other transport information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations. Ensure that the container valve is closed and not leaking.

### SECTION 15: Regulatory information

**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**  
Seveso Directive 96/82/EC: Covered

#### Other regulations

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work  
Council Directive 89/686/EEC on personal protective equipment  
Council Directive 67/548/EEC on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances  
Directive 1999/45/EC concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations  
Directive 97/23/EC on the approximation of the laws of the Member States concerning pressure equipment.

#### 15.2. Chemical safety assessment

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CSA has not been carried out.

### SECTION 16: Other information

Ensure all national/local regulations are observed. Ensure operators understand the toxicity hazard. Users of breathing apparatus must be trained. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

#### Advice

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

#### Further information

Note:

When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

#### References

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to: European Chemical Agency: Guidance on the Compilation of Safety Data Sheets., European Chemical Agency: Information on Registered Substances <http://apps.echa.europa.eu/registered/registered-sub.aspx#search> , European Industrial Gases Association (EIGA) Doc. 918/11 Classification, Labelling and Safety data sheet guide., ISO 10156:2010 Gases and gas mixtures -- Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets., International Programme on Chemical Safety (<http://www.inchem.org/>), Matheson Gas Data Book, 7th Edition., National Institute for Standards and Technology (NIST) Standard Reference Database Number 69, The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>), The European Chemical Industry Council (CEFIC) ERICards., United States of America's National Library of Medicine's toxicology data network TOXNET (<http://toxnet.nlm.nih.gov/index.html> ), Substance specific information from suppliers. EH40 (as ammended) Workplace exposure limits.

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End of document