



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

Boron trichloride

Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
Revision Date:	23.11.2023		1/51
Last revised date :	14.04.2022		

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

1.1 Product identifier

Product name: Boron trichloride
 Trade name: Boron trichloride 5.0

Additional identification

Chemical name: Boron trichloride
 Chemical formula: BCl₃
 INDEX No. 005-002-00-5
 CAS-No. 10294-34-5
 EC No. 233-658-4
 REACH Registration No. 01-2119962197-29

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

Identified uses: Industrial and professional. Perform risk assessment prior to use.
 Use for electronic component manufacture. Use of gas to manufacture pharmaceutical products. Using gas as feedstock in chemical processes.
 Formulation of mixtures with gas in pressure receptacles.
 Uses advised against Consumer use.

1.3 Details of the supplier of the safety data sheet

Supplier
 Oy Linde Gas Ab Telephone: +358 10 2421
 Itsehallintokuja 6
 FIN-02600 ESPOO
 E-mail: sds.ren@linde.com

1.4 Emergency telephone number: Poison Information Center: open 24 hours a day, tel. 09 471 977

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture



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Precautionary Statements

General

None.

Prevention:

P260: Do not breathe gas/vapors.
 P280: Wear protective gloves/protective clothing/eye protection/face protection. P260: Do not breathe gas/vapors.
 P273: Avoid release to the environment.
 P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response:

P303+P361+P353+P315: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower. Get immediate medical advice/attention.
 P304+P340+P315: IF INHALED: Remove person to fresh air and keep comfortable for breathing. 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. P303+P361+P353+P315: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower. Get immediate medical advice/attention.
 P304+P340+P315: IF INHALED: Remove person to fresh air and keep comfortable for breathing. 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.

Storage:

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

Disposal

None.

Supplemental information

EUH071: Corrosive to the respiratory tract.
 EUH014: Reacts violently with water. EUH071: Corrosive to the respiratory tract.
 EUH014: Reacts violently with water.



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Unknown toxicity - Health

Acute toxicity, inhalation, gas 0 %
 Acute toxicity, oral 0 %

Unknown toxicity - Environment

Acute hazards to the aquatic environment 0 %
 Chronic hazards to the aquatic environment 0 %

2.3 Other hazards

Contact with evaporating liquid may cause frostbite or freezing of skin.
 Not classified as PBT or vPvB.
 Not classified as PBT or vPvB.

Endocrine disrupting properties-Toxicity

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Endocrine disrupting properties-Ecotoxicity

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.



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SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name Boron trichloride
INDEX No.: 005-002-00-5
CAS-No.: 10294-34-5
EC No.: 233-658-4
REACH Registration No.: 01-2119962197-29
Purity: 100%
 The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.
Trade name: Boron trichloride 5.0

Chemical name	Chemical formula	Concentration	CAS-No.	EC No.	REACH Registration No.	M-Factor:	Notes
Boron trichloride	BCl ₃	100%	10294-34-5	233-658-4	01-2119962197-29	-	

The concentrations of the components in the SDS header, product name on page one and in section 3.2 are in mol due to regulatory requirements. All concentrations are nominal.

This substance has workplace exposure limit(s).

This substance is listed as SVHC.PBT: persistent, bioaccumulative and toxic substance.

vPvB: very persistent and very bioaccumulative substance.

SECTION 4: First aid measures

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

4.1 Description of first aid measures

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



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Eye contact: Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Skin Contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Contact with evaporating liquid may cause frostbite or freezing of skin.

Ingestion: Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed: Causes severe skin burns and eye damage. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. May be fatal if inhaled. May result in pulmonary oedema

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: Causes severe skin burns and eye damage. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. May be fatal if inhaled. May result in pulmonary oedema

Treatment: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention. Treat with a corticosteroid spray as soon as possible after inhalation. In case of exposure, provide oxygen.

SECTION 5: Firefighting measures

General Fire Hazards: Heat may cause the containers to explode.

5.1 Extinguishing media

Suitable extinguishing media: Use water spray to reduce vapors or divert vapor cloud drift. Water Spray or Fog. Dry powder. Foam. Carbon Dioxide.

Unsuitable extinguishing media: Do not use water jet as an extinguisher, as this will spread the fire.

5.2 Special hazards arising from the substance or mixture: Fire or excessive heat may produce hazardous decomposition products.



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Hazardous Combustion Products: None that are more toxic than the product itself.

5.3 Advice for firefighters

Special fire-fighting procedures:

In case of fire: Stop leak if safe to do so. Use of water may result in the formation of very toxic aqueous solutions. Keep run-off water out of sewers and water sources. Dike for water control. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out. Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.

Special protective equipment for fire-fighters:

Gas tight chemically protective clothing (Type 1) in combination with self contained breathing apparatus.
 Guideline: EN 943-2 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) Guideline: EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Evacuate area. Provide adequate ventilation. Monitor the concentration of the released product. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking. Keep upwind.

6.2 Environmental Precautions:

Prevent further leakage or spillage if safe to do so. Reduce vapour with fog or fine water spray. Keep run-off water out of sewers and water sources. Dike for water control.

6.3 Methods and material for containment and cleaning up:

Provide adequate ventilation. Wash contaminated equipment or sites of leaks with copious quantities of water.

6.4 Reference to other sections:

Refer to sections 8 and 13.



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SECTION 7: Handling and storage:

7.1 Precautions for safe handling: Only experienced and properly instructed persons should handle gases under pressure. Avoid exposure - obtain special instructions before use. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Installation of a cross purge assembly between the container and the regulator is recommended. Excess pressure must be vented through an appropriate scrubber system. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/regional/national/international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. 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. Damaged valves should be reported immediately to the supplier Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminants particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.

7.2 Conditions for safe storage, including any incompatibilities: Containers should not be stored in conditions likely to encourage corrosion. Keep away from food, drink and animal feeding stuffs. 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 material.



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7.3 Specific end use(s): None.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

None of the components have assigned exposure limits.

Biological Limit Values

No biological exposure limits noted for the ingredient(s).

DNEL-Values

Critical component	Type	Value	Remarks
Boron trichloride	Workers - Inhalation, Local, short-term	16 mg/m ³	respiratory tract irritation
	Workers - Inhalation, Local, long-term	8 mg/m ³	respiratory tract irritation
	Workers - Inhalation, Systemic, long-term	16 mg/m ³	Repeated dose toxicity

PNEC-Values

Critical component	Type	Value	Remarks
Boron trichloride	Aquatic (marine water)	39 µg/l	-
Boron trichloride	Sewage treatment plant	39 µg/l	-
Boron trichloride	Sediment (marine water)	39 µg/kg	-
Boron trichloride	Aquatic (freshwater)	39 µg/l	-
Boron trichloride	Sediment (freshwater)	39 µg/kg	-
Boron trichloride	Soil	11 µg/kg	-
Boron trichloride	Aquatic (intermit. releases)	48 µg/l	-



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8.2 Exposure controls

Appropriate engineering controls:

Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Provide adequate general and local exhaust ventilation. Keep concentrations well below occupational exposure limits. Gas detectors should be used when toxic quantities may be released. Systems under pressure should be regularly checked for leakages. Product to be handled in a closed system and under strictly controlled conditions. Only use permanent leak tight installations (e.g. welded pipes). Do not eat, drink or smoke when using the product.

Individual protection measures, such as personal protective equipment

General information:

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. Keep self contained breathing apparatus readily available for emergency use. 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. Protect eyes, face and skin from contact with product. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

Eye/face protection:

Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Guideline: EN 166 Personal Eye Protection.

Skin protection

Hand Protection:

Guideline: EN 388 Protective gloves against mechanical risks.
 Additional Information: Wear working gloves while handling containers
 Guideline: EN 374-1/2/3 Protective gloves against chemicals and micro-organisms.
 Additional Information: 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: Chloroprene rubber.
 Additional Information: Wear chemical-resistant gloves. Contact glove manufacturer for specific information.
 Material: Neoprene.



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Body protection: Keep suitable chemically resistant protective clothing readily available for emergency use.
Guideline: EN 943 Protective clothing against liquid and gaseous chemicals, including liquid aerosols and solid particles.

Other: Wear safety shoes while handling containers
Guideline: ISO 20345 Personal protective equipment - Safety footwear.

Respiratory Protection: Reference should be made to European Standard EN 689 for methods for the assessment of exposure by inhalation to chemical agents and national guidance documents for methods for the determination of hazardous substances. When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used. 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. Self-contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres

Guideline: EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking. Material: Filter B-P3
Guideline: EN 14387 Respiratory protective devices. Gas filter(s) and combined filter(s). Requirements, testing, marking.
Guideline: EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking.

Thermal hazards: No precautionary measures are necessary.

Hygiene measures: Obtain special instructions before use. Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

Environmental exposure controls: For waste disposal, see section 13 of the SDS.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state: Gas

Form: Liquefied gas



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Color:	Colorless Gives off white fumes in moist air
Odor:	Sharp irritating odor
Odor Threshold:	Odor threshold is subjective and is inadequate to warn of over exposure.
Melting Point:	+/- -161,1 °F/-107,3 °C Experimental result, Key study
Boiling Point:	54,5 °F/12,5 °C
Flammability:	This product is not flammable.
Upper/lower limit on flammability or explosive limits	
Explosive limit - upper:	Not applicable
Explosive limit - lower:	Not applicable
Flash Point:	Not applicable to gases and gas mixtures.
Autoignition Temperature:	Not applicable.
Decomposition Temperature:	When heated to decomp, emits toxic fumes of hydrogen chloride.
pH:	Not applicable
Viscosity	
Dynamic viscosity:	0,011 mPa.s (68 °F/20 °C) Experimental result, Key study
Kinematic viscosity:	No data available.
Solubility(ies)	
Solubility in Water:	Completely Soluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	Not known.
Dispersion Stability:	No data available.
Vapor pressure:	Approximate 131,7 kPa (70,0 °F/21,1 °C) Experimental result, Key study
Relative density:	1,35 (54 °F/12 °C)
Density:	+/- 1,3728 g/cm ³ (32 °F/0 °C) Experimental result, Key study 1,31 g/cm ³ (122,0 °F/50,0 °C)
Relative vapor density:	4,03
Particle characteristics:	Not applicable

9.2 Other information

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Flammability: Ki: 1,5
Molecular weight: 117,19 g/mol (BCl3)
Critical Temp. (°C): 181,9 °C

SECTION 10: Stability and reactivity

- 10.1 Reactivity: No reactivity hazard other than the effects described in sub-section below.
- 10.2 Chemical Stability: Stable under normal conditions.
- 10.3 Possibility of hazardous reactions: Material may react violently with water.
- 10.4 Conditions to avoid: Avoid moisture in the installation.
- 10.5 Incompatible Materials: Moisture. For material compatibility see latest version of ISO-11114. Reacts with most metals in the presence of moisture, liberating hydrogen, an extremely flammable gas. With water causes rapid corrosion of some metals. Reacts with water to form corrosive acids. May react violently with alkalis.
- 10.6 Hazardous Decomposition Products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

General information: Irritates mucous membranes. Inhalation can cause damage to respiratory tract and lungs. Risk of serious health injuries in case of long term exposure.

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity - Oral Product Fatal if swallowed.

Acute toxicity - Dermal Product



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Acute toxicity - Inhalation

Product Fatal if inhaled.

Boron trichloride LC 50 (Rat, 1 h): 2541 ppm

Repeated dose toxicity

Boron trichloride NOAEL : 15 mg/m³ Inhalation Read-across based on grouping of substances (category approach), Not specified

Skin Corrosion/Irritation

Product Causes severe burns.

Serious Eye Damage/Eye Irritation

Product Causes serious eye damage.

Respiratory or Skin Sensitization

Product Based on available data, the classification criteria are not met.

Germ Cell Mutagenicity

Product Based on available data, the classification criteria are not met.

Carcinogenicity

Product Based on available data, the classification criteria are not met.

Reproductive toxicity

Product Based on available data, the classification criteria are not met.

Specific Target Organ Toxicity - Single Exposure

Product May cause respiratory irritation.

Boron trichloride
Route of Exposure: Inhalation
Target Organ(s): Lungs, Kidneys.
Causes damage to organs.

Specific Target Organ Toxicity - Repeated Exposure

Product Based on available data, the classification criteria are not met.



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**Aspiration Hazard
Product**

Not applicable to gases and gas mixtures..

11.2 Information on other hazards

Endocrine disrupting properties

Product:

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.;

Components:

Boron trichloride

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.;

Other information

Product:

No data available.

SECTION 12: Ecological information

General information:

Avoid release to the environment. Product is not allowed to be discharged into ground water or the aquatic environment. Not applicable

12.1 Toxicity

Acute toxicity

Product

Harmful to aquatic life with long lasting effects.

Acute toxicity - Fish

Boron trichloride

LC 50 (Fish, 96 h): > 22 mg/l

Acute toxicity - Aquatic Invertebrates

Boron trichloride

LC 50 (Water flea (Daphnia magna), 48 h): > 0,49 mg/l

Toxicity to microorganisms

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EC 50 (Alga, 72 h): > 0,73 mg/l



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**12.2 Persistence and Degradability
Product**

Not applicable to gases and gas mixtures..

Biodegradation

Inorganic The product is not readily biodegradable.

**12.3 Bioaccumulative potential
Product**

The substance has no potential for bioaccumulation.

**12.4 Mobility in soil
Product**

The substance has low mobility in soil.

**12.5 Results of PBT and vPvB
assessment
Product**

Not classified as PBT or vPvB. Not classified as PBT or vPvB.

Other Ecological Information

May cause pH changes in aqueous ecological systems.
May cause pH changes in aqueous ecological systems. Depending on local conditions and existing concentrations, disturbances in the biodegradation process of activated sludge are possible.

12.6 Endocrine disrupting properties:

Product: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Components:
Boron trichloride The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects:

**Other hazards
Product:** No data available.



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Other effects:

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: Must not be discharged to atmosphere. Consult supplier for specific recommendations.

Disposal methods: 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. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws. Gas may be scrubbed in alkaline solution under controlled conditions to avoid violent reaction.

European Waste Codes

Container: 16 05 04*: Gases in pressure containers (including halons) containing hazardous substances.

SECTION 14: Transport information

ADR

- 14.1 UN number or ID number: UN 1741
- 14.2 UN Proper Shipping Name: BORON TRICHLORIDE
- 14.3 Transport Hazard Class(es)
 - Class: 2
 - Label(s): 2.3, 8
 - Hazard No. (ADR): 268
 - Tunnel restriction code: (C/D)
- 14.4 Packing Group: -
 - Limited quantity: None.
 - Excepted quantity: None.
- 14.5 Environmental hazards: Not applicable
- 14.6 Special precautions for user: -



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RID

- 14.1 UN number or ID number: UN 1741
- 14.2 UN Proper Shipping Name: BORON TRICHLORIDE
- 14.3 Transport Hazard Class(es)
Class: 2
Label(s): 2.3, 8
- 14.4 Packing Group:
Limited quantity: -
Excepted quantity: None.
- 14.5 Environmental hazards: Not applicable
- 14.6 Special precautions for user: -

IMDG

- 14.1 UN number or ID number: UN 1741
- 14.2 UN Proper Shipping Name: BORON TRICHLORIDE
- 14.3 Transport Hazard Class(es)
Class: 2.3
Label(s): 2.3, 8
EmS No.: F-C, S-U
- 14.4 Packing Group:
Limited quantity: -
Excepted quantity: None.
- 14.5 Environmental hazards: Not applicable
- 14.6 Special precautions for user: -

IATA

- 14.1 UN number or ID number: UN 1741
- 14.2 Proper Shipping Name: Boron trichloride
- 14.3 Transport Hazard Class(es):
Class: 2.3
Label(s): -
- 14.4 Packing Group:
Limited quantity: -
Excepted quantity: None.



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14.5 Environmental hazards: Not applicable

14.6 Special precautions for user: -

Other information

Passenger and cargo aircraft: Forbidden.

Cargo aircraft only: Forbidden.

14.7 Maritime transport in bulk according to IMO instruments

Not applicable for product as supplied.

Additional identification:

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 container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

EU Regulations

EU. REACH Annex XIV, Substances Subject to Authorization as amended: None present or none present in regulated quantities.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended: None present or none present in regulated quantities.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended: None present or none present in regulated quantities.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended: None present or none present in regulated quantities.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended: None present or none present in regulated quantities.



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EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, Annex I:

Classification	Lower-tier Requirements	Upper-tier Requirements
H2: ACUTE TOXIC (Category 2, all exposure routes; Category 3, inhalation)	50 t	200 t
O1: Substances or mixtures with hazard statement EUH014	100 t	500 t

Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:

Chemical name	CAS-No.	Concentration
Boron trichloride	10294-34-5	100%

National Regulations

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work Directive 2016/425/EEC on personal protective equipment Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.
This Safety Data Sheet has been produced to comply with Regulation (EU) 2020/878.

15.2 Chemical safety assessment: Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Revision Information: Not relevant.

Abbreviations and acronyms:

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the



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German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; EIGA - European Industrial Gases Association; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - substance of very high concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative



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Key literature references and sources for data:

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:

- Agency for Toxic Substances and Diseases Registry (ATSDR) (<http://www.atsdr.cdc.gov/>).
- 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. 169 "Classification and Labelling guide", as amended.
- International Programme on Chemical Safety (<http://www.inchem.org/>)
- ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
- 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>)
- Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
- Substance specific information from suppliers.

Details given in this document are believed to be correct at the time of publication.

Wording of the H-statements in section 2 and 3

H280	Contains gas under pressure; may explode if heated.
H300	Fatal if swallowed.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H330	Fatal if inhaled.
H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.

Training information:

Users of breathing apparatus must be trained. Ensure operators understand the toxicity hazard.



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Classification according to Regulation (EC) No 1272/2008 as amended.

Press. Gas Liq. Gas, H280
 Acute Tox. 2, H300
 Acute Tox. 2, H330
 Skin Corr. 1B, H314
 Eye Dam. 1, H318
 STOT SE 3, H335
 Aquatic Chronic 3, H412

Other information:

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. 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.

Last revised date:

23.11.2023

Disclaimer:

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.



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Annex to the extended Safety Data Sheet (eSDS)

Content

Exposure Scenario 1.	Industrial use, Formulation & (re)packing of substances and mixtures
Exposure Scenario 2.	Industrial use, Using gas as feedstock in chemical processes.
Exposure Scenario 3.	Industrial use, Use for electronic component manufacture.
Exposure Scenario 4.	Industrial use, Use of gas to manufacture pharmaceutical products.
Exposure Scenario 5.	Industrial use, Preparation of material for application

Exposure Scenario 1.

Exposure scenario worker

1. Industrial use, Formulation & (re)packing of substances and mixtures

List of use descriptors	
Sector(s) of use	
Product categories [PC]:	PC0: Other
Name of contributing environmental scenario and corresponding ERC	Formulation of mixtures with gas in pressure receptacles, <u>Transfilling gas or liquid.</u> ERC2: Formulation into mixture
Contributing Scenarios	Formulation of mixtures with gas in pressure receptacles, <u>Transfilling gas or liquid.</u> PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities



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Revision Date:	23.11.2023		25/51
Last revised date :	14.04.2022		

2.1. Contributing exposure scenario controlling environmental exposure for: Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
----------------------------------------------	---------------------------------------------------------

Physical form of the product	See section 9 of the SDS.
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Viscosity:	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,011 mPa.s (68 °F/20 °C)

Amounts used

Regional use tonnage (tons/year):	No data available.
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Frequency and duration of use

Batch process:	not relevant
Continuous process:	not relevant

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant
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Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See chapter 8 of the safety data sheet (Environmental exposure controls).



SAFETY DATA SHEET

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Last revised date :	14.04.2022		

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Technical and organisational measures	Handle substance within a closed system.
Air	Air - minimum efficiency of 100 %
Soil	not relevant
Water	Water - minimum efficiency of 100 %
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	No data available
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	not relevant

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
See section 13 of the SDS		External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

Suitable recovery operations:	Treatment effectiveness	Remarks



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Last revised date :	14.04.2022		

See section 13 of the SDS	External recovery and recycling of waste should comply with applicable local and/or national regulations.
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Additional good practice advice beyond the REACH CSA

Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.

Process Categories:	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
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Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
----------------------------------------------	---------------------------------------------------------

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	1317 hPa
Process temperature:	>= 21 °C
Remarks	not relevant

Amounts used

No data available.

Frequency and duration of use

	Use duration:	Frequency of use:	Remarks
Hours per shift	8 h	5 days per week	PROC1, PROC8b

Human factors not influenced by risk management



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Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
Revision Date:	23.11.2023		28/51
Last revised date :	14.04.2022		

This information is not available.

Other given operational conditions affecting workers exposure

Other relevant operational conditions: . See section 8 of the SDS.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See chapter 7 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
Provide a basic standard of general ventilation (1 to 3 air changes per hour).				Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Provide a basic standard of general ventilation (1 to 3 air changes per hour).				Transfer of substance or mixture (charging and discharging) at dedicated facilities
Local exhaust ventilation				Transfer of substance or mixture (charging and discharging) at dedicated facilities

Organisational measures to prevent/limit releases, dispersion and exposure

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
See section 7 of the				



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
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SDS.				
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Conditions and measures related to personal protection, hygiene and health evaluation

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See chapter 8 of the safety data sheet (Personal protection equipment)

Additional good practice advice beyond the REACH CSA

See section 7 of the SDS. Handle product within a closed system. Apply a good standard of general or controlled ventilation when maintenance activities are carried out. Ensure operatives are trained to minimise exposure Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed

3. Exposure estimation

Environment:

Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.:

none

Health:

Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.:

none

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Check that RMMs and OCs are as described above or of equivalent efficiency Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see <http://www.ecetoc.org/tra>

Exposure Scenario 2.

Exposure scenario worker



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Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
Revision Date:	23.11.2023		30/51
Last revised date :	14.04.2022		

1. Industrial use, Using gas as feedstock in chemical processes.

List of use descriptors	
Sector(s) of use	SU9: Manufacture of fine chemicals
Product categories [PC]:	PC21: Laboratory chemicals

Name of contributing environmental scenario and corresponding ERC	<u>Using gas as feedstock in chemical processes.:</u> ERC6a: Use of intermediate
-------------------------------------------------------------------	-------------------------------------------------------------------------------------

Contributing Scenarios	<u>Using gas as feedstock in chemical processes.:</u> PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
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2.1. Contributing exposure scenario controlling environmental exposure for: Using gas as feedstock in chemical processes.

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
----------------------------------------------	---------------------------------------------------------

Physical form of the product	See section 9 of the SDS.
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Viscosity:	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,011 mPa.s (68 °F/20 °C)

Amounts used



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According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Revision Date:	23.11.2023		31/51
Last revised date :	14.04.2022		

Regional use tonnage (tons/year):	No data available.
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Frequency and duration of use

Batch process:	not relevant
Continuous process:	not relevant

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant
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Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See chapter 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Technical and organisational measures	Handle substance within a closed system.
Air	Air - minimum efficiency of 100 %
Soil	not relevant
Water	Water - minimum efficiency of 100 %
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	No data available
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Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	not relevant

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
See section 13 of the SDS		External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

Suitable recovery operations:	Treatment effectiveness	Remarks
See section 13 of the SDS		External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice beyond the REACH CSA

Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Using gas as feedstock in chemical processes.

Process Categories:	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
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According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Last revised date :	14.04.2022		

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
----------------------------------------------	---------------------------------------------------------

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	1317 hPa
Process temperature:	>= 21 °C
Remarks	not relevant

Amounts used

No data available.

Frequency and duration of use

	Use duration:	Frequency of use:	Remarks
Hours per shift	8 h	5 days per week	PROC1, PROC8b

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

Other relevant operational conditions:	. See section 8 of the SDS.
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Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See chapter 7 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks



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According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Provide a basic standard of general ventilation (1 to 3 air changes per hour).				Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Provide a basic standard of general ventilation (1 to 3 air changes per hour).				Transfer of substance or mixture (charging and discharging) at dedicated facilities
Local exhaust ventilation				Transfer of substance or mixture (charging and discharging) at dedicated facilities

Organisational measures to prevent/limit releases, dispersion and exposure

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
See section 7 of the SDS.				

Conditions and measures related to personal protection, hygiene and health evaluation

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See chapter 8 of the safety data sheet (Personal protection equipment)

Additional good practice advice beyond the REACH CSA

See section 7 of the SDS. Handle product within a closed system. Apply a good standard of general or controlled ventilation when maintenance activities are carried out. Ensure operatives are trained to minimise exposure Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed



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According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

Boron trichloride

Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
Revision Date:	23.11.2023		35/51
Last revised date :	14.04.2022		

3. Exposure estimation

Environment:

Using gas as feedstock in chemical processes.:

none

Health:

Using gas as feedstock in chemical processes.:

none

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Check that RMMs and OCs are as described above or of equivalent efficiency Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see <http://www.ecetoc.org/tra>

Exposure Scenario 3.

Exposure scenario worker

1. Industrial use, Use for electronic component manufacture.

List of use descriptors	
Sector(s) of use	SU16: Manufacture of computer, electronic and optical products, electrical equipment
Product categories [PC]:	PC33: Semiconductors
Name of contributing environmental scenario and corresponding ERC	Use for electronic component manufacture.: ERC6a: Use of intermediate
Contributing Scenarios	Use for electronic component manufacture.: PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
Revision Date:	23.11.2023		36/51
Last revised date :	14.04.2022		

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2.1. Contributing exposure scenario controlling environmental exposure for: Use for electronic component manufacture.

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
----------------------------------------------	---------------------------------------------------------

Physical form of the product	See section 9 of the SDS.
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Viscosity:	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,011 mPa.s (68 °F/20 °C)

Amounts used

Regional use tonnage (tons/year):	No data available.
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Frequency and duration of use

Batch process:	not relevant
Continuous process:	not relevant

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant
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Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
Revision Date:	23.11.2023		37/51
Last revised date :	14.04.2022		

See chapter 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Technical and organisational measures	Handle substance within a closed system.
Air	Air - minimum efficiency of 100 %
Soil	not relevant
Water	Water - minimum efficiency of 100 %
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	No data available
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	not relevant

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
See section 13 of the SDS		External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:



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According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
Revision Date:	23.11.2023		38/51
Last revised date :	14.04.2022		

Suitable recovery operations:	Treatment effectiveness	Remarks
See section 13 of the SDS		External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice beyond the REACH CSA

Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Use for electronic component manufacture.

Process Categories:	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
---------------------	---------------------------------------------------------------------------------------------------------------------------------------------

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
----------------------------------------------	---------------------------------------------------------

Physical form of the product:	See section 9 of the SDS.
-------------------------------	---------------------------

Vapour pressure:	1317 hPa
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Process temperature:	>= 21 °C
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Remarks	not relevant
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Amounts used

No data available.

Frequency and duration of use

	Use duration:	Frequency of use:	Remarks
Hours per shift	8 h	5 days per week	PROC1

Human factors not influenced by risk management



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According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

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Issue Date:	16.01.2013	Version: 2.2	SDS No.: 000010021839
Revision Date:	23.11.2023		39/51
Last revised date :	14.04.2022		

This information is not available.

Other given operational conditions affecting workers exposure

Other relevant operational conditions: . See section 8 of the SDS.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See chapter 7 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
Provide a basic standard of general ventilation (1 to 3 air changes per hour).				Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Organisational measures to prevent/limit releases, dispersion and exposure

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
See section 7 of the SDS.				

Conditions and measures related to personal protection, hygiene and health evaluation

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See chapter 8 of the safety data sheet (Personal



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				protection equipment)
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Additional good practice advice beyond the REACH CSA

See section 7 of the SDS. Handle product within a closed system. Apply a good standard of general or controlled ventilation when maintenance activities are carried out. Ensure operatives are trained to minimise exposure Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed

3. Exposure estimation

Environment:

Use for electronic component manufacture.:

none

Health:

Use for electronic component manufacture.:

none

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Check that RMMs and OCs are as described above or of equivalent efficiency Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see <http://www.ecetoc.org/tra>

Exposure Scenario 4.

Exposure scenario worker

1. Industrial use, Use of gas to manufacture pharmaceutical products.

List of use descriptors

Sector(s) of use	SU9: Manufacture of fine chemicals
Product categories [PC]:	PC29: Pharmaceuticals

Name of contributing environmental scenario and corresponding ERC	<u>Use of gas to manufacture pharmaceutical products.:</u> ERC6a: Use of intermediate
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Contributing Scenarios	<p><u>Use of gas to manufacture pharmaceutical products.:</u> PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions</p> <p>PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition</p>
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2.1. Contributing exposure scenario controlling environmental exposure for: Use of gas to manufacture pharmaceutical products.

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
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Physical form of the product	See section 9 of the SDS.
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Viscosity:	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,011 mPa.s (68 °F/20 °C)

Amounts used

Regional use tonnage (tons/year):	No data available.
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Frequency and duration of use

Batch process:	not relevant
Continuous process:	not relevant

Environment factors not influenced by risk management



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Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant
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Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See chapter 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Technical and organisational measures	Handle substance within a closed system.
Air	Air - minimum efficiency of 100 %
Soil	not relevant
Water	Water - minimum efficiency of 100 %
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	No data available
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	not relevant

Conditions and measures related to external treatment of waste for disposal



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Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
See section 13 of the SDS		External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

Suitable recovery operations:	Treatment effectiveness	Remarks
See section 13 of the SDS		External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice beyond the REACH CSA

Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Use of gas to manufacture pharmaceutical products.

Process Categories:	PROC2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
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Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	1317 hPa
Process temperature:	>= 21 °C



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Remarks	not relevant
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Amounts used

No data available.

Frequency and duration of use

	Use duration:	Frequency of use:	Remarks
Hours per shift	8 h	5 days per week	PROC2, PROC3

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

Other relevant operational conditions:	. See section 8 of the SDS.
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Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See chapter 7 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
Provide a basic standard of general ventilation (1 to 3 air changes per hour).				Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Local exhaust				Chemical production or



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ventilation				refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Provide a basic standard of general ventilation (1 to 3 air changes per hour).				Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Local exhaust ventilation				Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Organisational measures to prevent/limit releases, dispersion and exposure

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
See section 7 of the SDS.				

Conditions and measures related to personal protection, hygiene and health evaluation

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See chapter 8 of the safety data sheet (Personal protection equipment)

Additional good practice advice beyond the REACH CSA

See section 7 of the SDS. Handle product within a closed system. Apply a good standard of general or controlled



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ventilation when maintenance activities are carried out. Ensure operatives are trained to minimise exposure Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed

3. Exposure estimation

Environment:

Use of gas to manufacture pharmaceutical products.:

none

Health:

Use of gas to manufacture pharmaceutical products.:

none

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Check that RMMs and OCs are as described above or of equivalent efficiency Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see <http://www.ecetoc.org/tra>

Exposure Scenario 5.

Exposure scenario worker

1. Industrial use, Preparation of material for application

List of use descriptors	
Sector(s) of use	SU16: Manufacture of computer, electronic and optical products, electrical equipment
Product categories [PC]:	PC33: Semiconductors

Name of contributing environmental scenario and corresponding ERC	Glass-fibre production: ERC6a: Use of intermediate
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Contributing Scenarios	Glass-fibre production:
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	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
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2.1. Contributing exposure scenario controlling environmental exposure for: Glass-fibre production

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
----------------------------------------------	---------------------------------------------------------

Physical form of the product	See section 9 of the SDS.
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Viscosity:	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,011 mPa.s (68 °F/20 °C)

Amounts used

Regional use tonnage (tons/year):	No data available.
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Frequency and duration of use

Batch process:	not relevant
Continuous process:	not relevant

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant
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Risk management measures (RMM)



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Technical conditions and measures at process level (source) to prevent release

See chapter 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Technical and organisational measures	Handle substance within a closed system.
Air	Air - minimum efficiency of 100 %
Soil	not relevant
Water	Water - minimum efficiency of 100 %
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	No data available
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	not relevant

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
See section 13 of the SDS		External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste



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Fraction of used amount transferred to external waste treatment:

Suitable recovery operations:	Treatment effectiveness	Remarks
See section 13 of the SDS		External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice beyond the REACH CSA

Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Glass-fibre production

Process Categories:	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
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Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.
----------------------------------------------	---------------------------------------------------------

Physical form of the product:	See section 9 of the SDS.
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Vapour pressure:	1317 hPa
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Process temperature:	>= 21 °C
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Remarks	not relevant
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Amounts used

No data available.

Frequency and duration of use

	Use duration:	Frequency of use:	Remarks
Hours per shift	8 h	5 days per week	PROC1

Human factors not influenced by risk management



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This information is not available.

Other given operational conditions affecting workers exposure

Other relevant operational conditions: . See section 8 of the SDS.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See chapter 7 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
Provide a basic standard of general ventilation (1 to 3 air changes per hour).				Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Organisational measures to prevent/limit releases, dispersion and exposure

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
See section 7 of the SDS.				

Conditions and measures related to personal protection, hygiene and health evaluation

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See chapter 8 of the safety



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				data sheet (Personal protection equipment)
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Additional good practice advice beyond the REACH CSA

See section 7 of the SDS. Handle product within a closed system. Apply a good standard of general or controlled ventilation when maintenance activities are carried out. Ensure operatives are trained to minimise exposure Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed

3. Exposure estimation

Environment:

Glass-fibre production:

none

Health:

Glass-fibre production:

none

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

Check that RMMs and OCs are as described above or of equivalent efficiency Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see <http://www.ecetoc.org/tra>