

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

1.1. Product identifier

Name of the substance	Boron trichloride
Trade name of the substance	Trona® Boron Trichloride
Identification number	005-002-00-5 (Index number)
Registration number	01-2119962197-29-0001
Synonyms	None.
SDS number	B-5001
Product code	Boron Trichloride
Issue date	09-February-2015
Version number	03
Revision date	20-April-2015
Supersedes date	27-March-2015

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

Identified uses	Chemical intermediate.
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name	Tronox Pigments (Holland) BV
Address	Prof. Gerbrandyweg 2 3197KK Rotterdam-Botlek The Netherlands
E-mail	ChemProdSteward@tronox.com
Telephone	+31 181 246600

1.4. Emergency telephone number +1-760-476-3962 (Access code: 333318)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Directive 67/548/EEC or 1999/45/EC as amended

Classification R14, T+;R26/28, C;R34

The full text for all R-phrases is displayed in section 16.

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

Physical hazards

Gases under pressure	Compressed gas	H280 - Contains gas under pressure; may explode if heated.
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Health hazards

Acute toxicity, oral	Category 2	H300 - Fatal if swallowed.
Acute toxicity, inhalation	Category 2	H330 - Fatal if inhaled.
Skin corrosion/irritation	Category 1B	H314 - Causes severe skin burns and eye damage.
Specific target organ toxicity - single exposure	Category 3 respiratory tract irritation	H335 - May cause respiratory irritation.

Hazard summary

Physical hazards	Reacts violently with water.
Health hazards	Very toxic by inhalation and if swallowed. Causes burns.
Environmental hazards	Not classified for hazards to the environment.

Specific hazards	Causes skin and eye burns. This material is a gas under normal atmospheric conditions and ingestion is unlikely. However: Causes digestive tract burns. Can cause severe respiratory irritation. May cause lung oedema. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. May cause damage to the liver and kidneys. Boron: High doses have demonstrated effects on fertility, testes, and developmental effects on the fetus in laboratory animals. Relevance of these findings to humans is uncertain.
Main symptoms	Contact with this material will cause burns to the skin, eyes and mucous membranes. Cough, shortness of breath, headache, nausea, vomiting. Swallowing may cause nausea; vomiting or diarrhea of blue-green materials are common and may be accompanied by dark blood. Be aware that symptoms of lung oedema (shortness of breath) may develop up to 24 hours after exposure.

2.2. Label elements

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

Contains: Boron trichloride

Hazard pictograms



Signal word Danger

Hazard statements

H280	Contains gas under pressure; may explode if heated.
H300	Fatal if swallowed.
H314	Causes severe skin burns and eye damage.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.

Precautionary statements

Prevention

P260	Do not breathe gas.
P284	Wear respiratory protection.
P280	Wear protective gloves/protective clothing/eye protection/face protection.

Response

P304 + P340	IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage

P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
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Disposal

P501	Dispose of contents/container in accordance with local/regional/national/international regulations.
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Supplemental label information Reacts violently with water.

2.3. Other hazards Not a PBT or vPvB substance or mixture. Reacts violently with water.

SECTION 3: Composition/information on ingredients

3.1. Substances

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Boron trichloride	99.95	10294-34-5 233-658-4	01-2119962197-29-0001	005-002-00-5	
Classification:	DSD:	R14, T+;R26/28, C;R34			
	CLP:	Press. Gas;H280, Acute Tox. 2;H300, Skin Corr. 1B;H314, Acute Tox. 2;H330, STOT SE 3;H335			

List of abbreviations and symbols that may be used above

DSD: Directive 67/548/EEC.
CLP: Regulation No. 1272/2008.

Composition comments

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. The full text for all R- and H-phrases is displayed in section 16.

SECTION 4: First aid measures

General information	Chemical burns must be treated by a physician. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Be aware that symptoms of chemical pneumonia (shortness of breath) may occur several hours after exposure. Inhalation may result in delayed onset of dyspnea, chest pain, and pulmonary edema. Be alert to kidney involvement due to boron toxicity and concentration effects during excretion.
4.1. Description of first aid measures	
Inhalation	Move injured person into fresh air and keep person calm under observation. For breathing difficulties, oxygen may be necessary. Get medical attention immediately. If breathing stops, provide artificial respiration.
Skin contact	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Frostbite: Do not remove clothes, but flush with copious amounts of lukewarm water. Call an ambulance and continue to flush during transportation to hospital.
Eye contact	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. If frostbite occurs, immediately flush eyes with plenty of warm water (not exceeding 105°F/41°C) for at least 15 minutes. If easy to do, remove contact lenses.
Ingestion	This material is a gas under normal atmospheric conditions and ingestion is unlikely. If ingestion occurs: Call a physician or poison control center immediately. DO NOT induce vomiting. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head lower than the hips to help prevent aspiration.
4.2. Most important symptoms and effects, both acute and delayed	Contact with this material will cause burns to the skin, eyes and mucous membranes. Cough, shortness of breath, headache, nausea, vomiting. Swallowing may cause nausea; vomiting or diarrhea of blue-green materials are common and may be accompanied by dark blood.
4.3. Indication of any immediate medical attention and special treatment needed	Be aware that symptoms of lung oedema (shortness of breath) may develop up to 24 hours after exposure. Inhalation may result in delayed onset of dyspnea, chest pain, and pulmonary edema. Be alert to kidney involvement due to boron toxicity and concentration effects during excretion.

SECTION 5: Firefighting measures

General fire hazards	Containers can burst violently when heated, due to excess pressure build-up.
5.1. Extinguishing media	
Suitable extinguishing media	Carbon dioxide or dry powder.
Unsuitable extinguishing media	Reacts with water. Do not use water jet as an extinguisher, as this will spread the fire.
5.2. Special hazards arising from the substance or mixture	Hydrogen chloride gas. Chlorine. Boron oxides.
5.3. Advice for firefighters	
Special protective equipment for firefighters	In case of contact with water used for fire extinguishing, use chemical resistant protective suit.
Special fire fighting procedures	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. ALWAYS stay away from tanks engulfed in flame. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Withdraw immediately in case of rising sound from venting safety device or any discolouration of tanks due to fire. Move containers from fire area if you can do so without risk. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
Specific methods	Evacuate area. Cool containers exposed to flames with water until well after the fire is out. Do not get water inside container. Remove pressurised gas cylinders from the immediate vicinity. Close the valve if no risk is involved. Do not extinguish a leaking gas fire unless leak can be stopped. If leak cannot be stopped and no danger to surrounding area allow the fire to burn out. Fight fire from a protected location.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures	
For non-emergency personnel	If leakage cannot be stopped, evacuate area. Stay upwind. Ventilate closed spaces before entering. DO NOT touch spilled material. Avoid contact with cold gas. Avoid inhalation and contact with skin and eyes. In aqueous solution: Avoid contact with spilled material. Ensure suitable personal protection (including respiratory protection) during removal of spillages in a confined area. See Section 8 for personal protective equipment.
For emergency responders	Keep unnecessary personnel away. Use personal protection recommended in section 8 of the SDS.

- 6.2. Environmental precautions** Stop leak if possible without any risk. Sewers must be covered and basements and workpits evacuated. Avoid release to the environment. Local authorities should be advised if significant releases cannot be contained.
- 6.3. Methods and material for containment and cleaning up** Ventilate well, stop flow of gas or liquid if possible. Prevent entry into waterways, sewers, basements or confined areas. Use water spray to reduce vapours or divert vapour cloud drift. Do not put water directly on leak, spill area or inside container. Allow gas to dissipate into the atmosphere. vapour can be controlled using a water fog. Water used for control of vapor may become corrosive or toxic and should be contained properly for later disposal.
- Small Spills: In aqueous solution: Absorb spillage with non-combustible, absorbent material. Shovel up and place in a non-metal waste container for later disposal. Neutralize spill area and wash with plenty of water.
- Large Spills: Dike flow of spilled material using soil or sandbags. Isolate area until gas has dispersed.
- 6.4. Reference to other sections** See Section 8 for personal protective equipment. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

- 7.1. Precautions for safe handling** Use only with adequate ventilation. Avoid any exposure. Open valve slowly. Secure that cylinders are not exposed to heat. Immediately change contaminated clothes. When using, do not eat, drink or smoke. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat and flame. Wear approved safety goggles. Wear protective gloves and appropriate clothing to prevent skin contact. See Section 8 for personal protective equipment. Observe good industrial hygiene practices.
- 7.2. Conditions for safe storage, including any incompatibilities** Compressed gas storage. Store in a cool and well-ventilated place. Secure cylinders from falling or being knocked over.
- 7.3. Specific end use(s)** Chemical intermediate

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

- Occupational exposure limits** No exposure limits noted for ingredient(s).
- Biological limit values** No biological exposure limits noted for the ingredient(s).
- Recommended monitoring procedures** Follow standard monitoring procedures.

Derived no-effect level (DNEL)

Material	Type	Route	Value	Form
Boron trichloride (CAS 10294-34-5)	Workers	Inhalation	8 mg/m3	Acute exposure local effects
		Inhalation	16 mg/m3	Long term exposure local effects

Predicted no effect concentrations (PNECs)

Material	Type	Route	Value	Form
Boron trichloride (CAS 10294-34-5)	Aqua (freshwater)	Not applicable	39 µg/l	
	Aqua (intermittent releases)	Not applicable	48 µg/l	
	Aqua (marine water)	Not applicable	39 µg/l	
	Not applicable	Air	16 mg/m3	
		Soil	11 µg/kg	soil dw
	Sediment (freshwater)	Not applicable	39 µg/l	
	Sediment (marine water)	Not applicable	39 µg/l	sediment dw
Sewage Treatment Plant	Not applicable	39 µg/l		

8.2. Exposure controls

- Appropriate engineering controls** Provide adequate general and local exhaust ventilation. Eye wash facilities and emergency shower must be available when handling this product.
- Individual protection measures, such as personal protective equipment**
- General information** Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.
- Eye/face protection** Wear approved chemical safety goggles. Gas-proof goggles are recommended. (e.g. EN 166).
- Skin protection**

- Hand protection	Risk of contact: Wear cold insulating gloves. Wear suitable gloves tested to EN374. Suitable gloves can be recommended by the glove supplier.
- Other	Wear appropriate chemical resistant clothing to prevent any possibility of skin contact.
Respiratory protection	Respirator type: Chemical respirator with specific cartridge and full facepiece providing protection against the compound of concern. Seek advice from local supervisor. Wear suitable respiratory protection.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
Hygiene measures	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Observe any medical surveillance requirements.
Environmental exposure controls	Environmental manager must be informed of all significant spillages.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	Compressed liquefied gas.
Physical state	Gas.
Form	Compressed gas.
Colour	Clear.
Odour	Pungent.
Odour threshold	Not available.
pH	Not applicable.
Melting point/freezing point	-107.3 °C (-161.14 °F) at 101.325 kPa
Initial boiling point and boiling range	12.4 °C (54.32 °F) at 101.325 kPa
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Vapour pressure	131.7 kPa at 21.1 °C
Vapour density	Not available.
Relative density	4.12 (0 °C (32 °F))
Solubility(ies)	Decomposes in contact with water.
Partition coefficient (n-octanol/water)	Not applicable. Not applicable.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Explosive properties	Not available.
Oxidizing properties	Not available.

9.2. Other information

Bulk density	89 lb/ft ³
Density	1.37 g/cm ³
Dynamic viscosity	0.01 mPa.s
Molecular formula	B-Cl ₃
Molecular weight	117.19 g/mol

SECTION 10: Stability and reactivity

10.1. Reactivity	Material reacts with water.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	Reacts vigorously with water, liberating heat and forming hydrochloric acid and boric acid. Reacts with moist air, producing hydrochloric acid fumes and boric acid.
10.4. Conditions to avoid	Heat, sparks, flames, elevated temperatures. Do not allow water to get into container because of violent heat release reaction.

- 10.5. Incompatible materials** Because of its tendency to form hydrochloric acid, the material should be kept away from: Alcohols. Alkalies. Amines. Fats, grease. Organic material. Strong oxidising agents. Water.
- 10.6. Hazardous decomposition products** Hydrogen chloride gas. Chlorine. Boron oxides.

SECTION 11: Toxicological information

General information Corrosive. Contact with compressed gas can cause damage (frostbite) due to rapid evaporative cooling.

Information on likely routes of exposure

- Inhalation** Fatal if inhaled. Can cause severe respiratory irritation. May cause lung oedema.
- Skin contact** May cause serious chemical burns to the skin.
- Eye contact** Causes severe eye burns. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.
- Ingestion** Fatal if swallowed. This material is a gas under normal atmospheric conditions and ingestion is unlikely. However: Causes digestive tract burns.

Symptoms Contact with this material will cause burns to the skin, eyes and mucous membranes. Cough, shortness of breath, headache, nausea, vomiting. Swallowing may cause nausea; vomiting or diarrhea of blue-green materials are common and may be accompanied by dark blood.

11.1. Information on toxicological effects

Acute toxicity Fatal if inhaled. Fatal if swallowed. Causes skin, eye and digestive tract burns. Causes severe respiratory tract irritation.

Product	Species	Test results
Boron trichloride (CAS 10294-34-5)		
Acute		
<i>Inhalation</i>		
LC50	Rat	2541 ppm, 1 Hours
Skin corrosion/irritation	Causes skin burns.	
Serious eye damage/eye irritation	Causes severe eye burns.	
Respiratory sensitisation	Based on available data, the classification criteria are not met.	
Skin sensitisation	Not a skin sensitiser.	
Germ cell mutagenicity	Based on available data, the classification criteria are not met.	
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.	
Reproductive toxicity	Boron: High doses have demonstrated effects on fertility, testes, and developmental effects on the fetus in laboratory animals. Relevance of these findings to humans is uncertain.	
Specific target organ toxicity - single exposure	May cause respiratory irritation.	
Specific target organ toxicity - repeated exposure	Based on available data, the classification criteria are not met.	
Aspiration hazard	Not applicable.	
Mixture versus substance information	Not available.	
Other information	Be aware that symptoms of lung oedema (shortness of breath) may develop up to 24 hours after exposure. May cause damage to the kidneys.	

SECTION 12: Ecological information

- 12.1. Toxicity** In aqueous solution: Substantial amounts of the product may lead to a local change in acidity in small water systems which may have adverse effects on aquatic organisms.
- 12.2. Persistence and degradability** Expected to degrade rapidly in water due to hydrolysis.
- 12.3. Bioaccumulative potential** The product is not expected to bioaccumulate.
- Partition coefficient n-octanol/water (log Kow)** Not applicable.
- Bioconcentration factor (BCF)** Not available.
- 12.4. Mobility in soil** Not available.
- Mobility in general** The product reacts with water and will generate heat.
- 12.5. Results of PBT and vPvB assessment** Not a PBT or vPvB substance or mixture.

12.6. Other adverse effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste	Dispose in accordance with applicable federal, state, and local regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied.
EU waste code	16 05 04* Waste codes should be assigned by the user based on the application for which the product was used.
Disposal methods/information	The packaging should be collected for reuse. Dispose of this material and its container to hazardous or special waste collection point. Dispose in accordance with all applicable regulations.
Special precautions	Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

14.1. UN number	UN1741
14.2. UN proper shipping name	BORON TRICHLORIDE
14.3. Transport hazard class(es)	
Class	2.3
Subsidiary risk	8
Label(s)	2.3 +8
Hazard No. (ADR)	268
Tunnel restriction code	C/D
14.4. Packing group	Not applicable.
14.5. Environmental hazards	No.
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

RID

14.1. UN number	UN1741
14.2. UN proper shipping name	BORON TRICHLORIDE
14.3. Transport hazard class(es)	
Class	2.3
Subsidiary risk	8
Label(s)	2.3+8
14.4. Packing group	Not applicable.
14.5. Environmental hazards	No.
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

ADN

14.1. UN number	UN1741
14.2. UN proper shipping name	Boron Trichloride
14.3. Transport hazard class(es)	
Class	2.3
Subsidiary risk	8
Label(s)	2.3+8
14.4. Packing group	Not applicable.
14.5. Environmental hazards	No.
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IATA

14.1. UN number	UN1741
14.2. UN proper shipping name	Boron trichloride
14.3. Transport hazard class(es)	
Class	2.3
Subsidiary risk	8
Label(s)	2.3, 8
14.4. Packing group	Not applicable.
14.5. Environmental hazards	No.
ERG Code	2CP

14.6. Special precautions for user Passenger and Cargo Aircraft Quantity limitation: Forbidden.

IMDG

14.1. UN number UN1741

14.2. UN proper shipping name BORON TRICHLORIDE

14.3. Transport hazard class(es)

Class 2.3

Subsidiary risk 8

Label(s) 2.3, 8

14.4. Packing group Not applicable.

14.5. Environmental hazards

Marine pollutant No.

EmS F-C, S-U

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable. This product is a compressed or liquefied gas and when transported in bulk is covered under IGC code.

SECTION 15: Regulatory information

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

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended
Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended
Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1 as amended
Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2 as amended
Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3 as amended
Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V as amended
Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended
Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA
Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended
Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended
Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended
Not listed.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding, as amended
Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances

Boron trichloride (CAS 10294-34-5)

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

Boron trichloride (CAS 10294-34-5)

Directive 94/33/EC on the protection of young people at work

Boron trichloride (CAS 10294-34-5)

Other regulations	The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended and respective national laws implementing EC directives. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006. Young people under 18 years old are not allowed to work with this product according to the EU Directive 94/33/EC on the protection of young people at work.
National regulations	Follow national regulation for work with chemical agents.
15.2. Chemical safety assessment	Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations

DNEL: Derived No-Effect Level.
PNEC: Predicted No-Effect Concentration.
PBT: Persistent, bioaccumulative and toxic.
vPvB: Very Persistent and very Bioaccumulative.

References

IARC Monographs. Overall Evaluation of Carcinogenicity (Volumes 1-106)
Chemical safety report.

Information on evaluation method leading to the classification of mixture

The mixture is classified based on test data for physical hazards. The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available. For details, refer to Sections 9, 11 and 12.

Full text of any statements or R-phrases and H-statements under Sections 2 to 15

R14 Reacts violently with water.
R26/28 Very toxic by inhalation and if swallowed.
R34 Causes burns.
H280 Contains gas under pressure; may explode if heated.
H300 Fatal if swallowed.
H314 Causes severe skin burns and eye damage.
H330 Fatal if inhaled.
H335 May cause respiratory irritation.

Training information

Follow training instructions when handling this material.

Disclaimer

The information in the sheet was written based on the best knowledge and experience currently available.