

GPS Safety Summary

Substance Name:

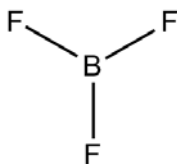
Boron trifluoride

1. General Statement

Boron trifluoride is an inorganic, strong acid gas. This pungent toxic gas forms white fumes in moist air; it is a useful Lewis acid and a versatile building block for other boron compounds.

2. Chemical Identity

Name:	Boron trifluoride
Brand names:	Boron trifluoride
Chemical name (IUPAC):	Boron trifluoride
CAS number:	7637-07-2
EC number:	231-569-5
Molecular formula:	BF ₃
Structure:	



3. Use and applications

This Lewis acid catalyst is used as a polymerization catalyst, diboran generator and in pharmaceutical synthesis.

Applications include:

- Petrochemical specialties
- High duty lubricants (PAO)
- C9 resins
- Pharmaceutical industry (new potent antibiotics)

4. Physical / Chemical properties

Boron trifluoride is an inorganic, strong Lewis acid gas. It forms a dihydrate (white fumes) in contact with moist air and reacts violently in direct contact with water. The non-hydrated form has the following physicochemical properties:

Property	Value
Physical state	Gas at 20°C and 1013 hPa
Form	Compressed gas (under pressure)
Colour	Colourless
Odour	Suffocating
Molecular weight	67.8 g/mol
Density	3.08 kg/m ³ at 25°C and 1013 hPa
Vapour pressure	4.87 MPa at -13°C
Freezing / boiling points	-126.8°C / -101°C at 1013 hPa
Flash point	Not applicable
Flammability	Non-flammable gas
Self-ignition temperature	Not applicable
Explosive / oxidizing properties	Not expected based on structure
Water solubility, Octanol-water partition coefficient (Log K _{ow})	Not applicable: reacts violently with water

5. Health Effects

Boron trifluoride is a gas with corrosive or severe irritant properties for ocular mucous membranes and respiratory airways. However serious accidents are rare as the thick white fumes formed on contact with air give the alarm.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Very toxic by inhalation. High concentrations cause pulmonary edema. Risk of burns to the mouth, oesophagus and stomach by ingestion of fumes Dermal: not relevant for a gas
Irritation / corrosion Skin / eye / respiratory tract	Skin and eye: corrosive May be severely irritating to respiratory tract
Sensitisation	Inhalation: no data. Dermal: not relevant for a gas.
Toxicity after repeated exposure Oral / inhalation / dermal	Inhalation: respiratory tract irritation and renal toxicity in animals exposed for up to 3 months. Dermal and oral: not relevant for a gas.
Genotoxicity / Mutagenicity	Not expected to cause genetic effects based on available <i>in vitro</i> test data.
Carcinogenicity	No concern for carcinogenicity in the absence of potential to induce genetic damage, hyperplasia or preneoplastic lesions.
Reproductive / Developmental Toxicity	There is no concern about the reproductive / developmental toxicity potential of the substance as any parental toxicity would occur at dose-levels well below a predictable reprotoxicity.

6. Environmental Effects

In contact with humid atmosphere, Boron trifluoride forms a dihydrate (BF₃, 2H₂O).

On the opposite if directly brought into contact with water, it reacts violently. In addition, hydrolysis tests performed on analogue substances have shown that Boron fluoride is hydrolytically instable. Therefore the assessment of environmental fate and pathways is based on the properties of its hydrolysis products, mainly boric acid, which is of very low acute aquatic toxicity and low long-term toxicity and is not expected to bioaccumulate in the food chain.

The sorption potential of boron on soils was widely described as low.

Effect Assessment	Result for hydrolysis products
Aquatic Toxicity	Acute, Chronic: not toxic

Fate and behaviour	Result for hydrolysis products
Degradation/Persistence	Hydrolyses rapidly: does not persist in water/soil/sediment.
Bioaccumulation potential	Not expected to bioaccumulate significantly
PBT / vPvB conclusion	Not considered to be PBT* or vPvB**

*: Persistent, Bioaccumulative and Toxic (PBT)

** : very Persistent and very Bioaccumulative (vPvB)

7. Exposure

7.1 Human health

Consumers:

Consumers are not directly exposed to Boron trifluoride because it is trapped in minimal amounts inside the matrix of final products, with no release.

Indirect exposure via the environment is negligible due to the instability in water and the low bioaccumulative potential.

Workers:

Boron trifluoride is industrially manufactured and used mainly in closed systems (except when present at low levels in preparations or articles) in a continuous or batch process, minimizing the occupational exposure potential. Workers may be exposed during cleaning, maintenance, transfer, sampling and analysis.

Procedures, controls, collective and personal risk management measures are in place, which limit the occupational exposure during the manufacture and use of the substance. Workers who might accidentally come into contact with the undiluted substance should follow the safety measures recommended in the Extended Safety Data Sheet.

Based on the risk assessment, the risk is controlled when activities are carried out under conditions recommended in the Extended Safety Data Sheet (see Chap. 8 and Exposure Scenarios).

7.2 Environment

Boron trifluoride is industrially manufactured and used mainly in closed systems (except when present at low levels in preparations or articles) in a continuous or batch process, minimizing release to the environment.

Procedures, controls and risk management measures are in place, which limit the environmental exposure.

The main expected release compartment is the atmosphere as Boron trifluoride is a gas. However, its high reactivity with moisture and water leads to degradation into other substances whenever released to air, water or soil.

Based on the risk assessment, the risk is controlled when activities are carried out under conditions recommended in the Extended Safety Data Sheet (see Chap. 8 and Exposure Scenarios).

8. Risk Management recommendations

Human health measures									
Organizational	Collect the latest available Safety Data Sheet. Implement good basic standards of occupational hygiene. Ensure operatives are well informed of the hazards and trained to minimise exposures. Handle and store according to the indications of the Safety Data Sheet.								
Engineering controls	Use material of high integrity for loading and unloading. Do not put in contact with, or near, water or moist air. Gas under pressure: avoid exposure of recipient to heat and sunlight. Provide appropriate local exhaust ventilation at points of emission. Monitor levels in work atmosphere. Ensure that eye- and handwash stations, safety showers and respirators are close to workstation locations.								
Protection	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #e0f7fa;">Eye/Face protection:</td> <td>Tightly fitting/side protection safety goggles</td> </tr> <tr> <td style="background-color: #e0f7fa;">Skin protection:</td> <td>Anti-acid protective suit, safety boots</td> </tr> <tr> <td style="background-color: #e0f7fa;">Hand protection:</td> <td>PVC gloves tested to EN374</td> </tr> <tr> <td style="background-color: #e0f7fa;">Respiratory protection:</td> <td>Complete mask (A2B2 filter) for low concentrations & short duration Self-contained breathing apparatus for higher concentrations or longer operations</td> </tr> </table>	Eye/Face protection:	Tightly fitting/side protection safety goggles	Skin protection:	Anti-acid protective suit, safety boots	Hand protection:	PVC gloves tested to EN374	Respiratory protection:	Complete mask (A2B2 filter) for low concentrations & short duration Self-contained breathing apparatus for higher concentrations or longer operations
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Environment protective measures									
Use water pulverization to treat gas. Do not let gas wash solutions enter into drains. Empty recipients into caustic soda/ slaked lime.									

9. Regulatory Information / Classification and Labelling

9.1 Regulatory Information





This substance has notably been registered and assessed under:

- EU Regulation EC 1907/2006 (REACH)

9.2 Classification and labelling

Under GHS, substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the eSDS.

GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers and emergency responders) can better understand the hazards of the chemicals in use. Substances registered for REACH are classified according to CLP (EC) 1272/2008, implementation of the GHS in the European Union.

Classification	
<ul style="list-style-type: none"> – Gases under pressure: Category Compressed Gas. – Acute toxicity - Inhalation: Category 2. – Skin corrosion: Category 1A. – Serious eye damage: Category 1. – Specific target organ toxicity - single exposure (inhalation): Category 3. – Specific target organ toxicity - repeated exposure (inhalation): Category 2. 	
Signal word	
Danger	
Pictograms	
– GHS04: Gas cylinder	
– GHS06: Skull and crossbones	
– GHS05: Corrosion	
– GHS08: Health hazard	
Hazard statements	
<ul style="list-style-type: none"> – H280: Contains gas under pressure; may explode if heated. – H330: Fatal if inhaled. – H314: Causes severe skin burns and eye damage. – H335: May cause respiratory irritation. – H373: May cause damage to organs (kidneys) through prolonged or repeated exposure (inhalation). – EUH014: Reacts violently with water.* 	

*: applies in Europe only (CLP Regulation (EC) 1272/2008)

10. Contact Information within Company

For further information on this substance or product safety summary in general, please contact:

- **ICCA portal where the GPS Safety Summary is posted:**
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>
- arkema-fluorochem-reach-uses@arkema.com

11. Date of Issues / Revision

- Date of issue: 2012/11/20
- Date of revision:

12. Disclaimer

The information contained in this paper is intended as advice only and whilst the information is provided in utmost good faith and has been based on the best information currently available, is to be relied upon at the user's own risk.

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