

# SAFETY DATA SHEET

Date Printed: 05/17/2024

Date Revised: 01/15/2022

## SECTION 1. IDENTIFICATION

**Product Identifier:** (4N) 99.99% Boron Chloride

**Product Code:** BO-CL-04

**CAS Number:** 10294-34-5

**Relevant identified uses of the substance:** Scientific research and development

Supplier details:

American Elements  
10884 Weyburn Ave.  
Los Angeles, CA 90024  
Tel: +1 310-208-0551  
Fax: +1 310-208-0351  
Emergency telephone number:  
+1 800-424-9300

## SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)

GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.

GHS06 Skull and crossbones

Acute Tox. 2 H300 Fatal if swallowed.

Acute Tox. 3 H331 Toxic if inhaled.

GHS08 Health hazard

Repr. 2 H361 Suspected of damaging fertility or the unborn child.

STOT RE 2 H373 May cause damage to the peripheral nervous system, the lung, the kidneys, the liver, the reproductive system and the brain through prolonged or repeated exposure. Route of exposure: Inhalative.

Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.

GHS05 Corrosion

Skin Corr. 1B H314 Causes severe skin burns and eye damage.

GHS07

STOT SE 3 H336 May cause drowsiness or dizziness.

Hazards not otherwise classified No data available

GHS label elements, including precautionary statements

Hazard pictograms



GHS02 GHS05 GHS06 GHS07 GHS08

Signal word Danger

Hazard-determining components of labeling:

Boron trichloride

n-Hexane

3-Methylpentane

Hazard statements

H225 Highly flammable liquid and vapor.

H300 Fatal if swallowed.

H331 Toxic if inhaled.

H314 Causes severe skin burns and eye damage.

H361 Suspected of damaging fertility or the unborn child.

H336 May cause drowsiness or dizziness.

H373 May cause damage to the peripheral nervous system, the lung, the kidneys, the liver, the reproductive system and the brain through prolonged or repeated exposure. Route of exposure: Inhalative.

H304 May be fatal if swallowed and enters airways.

Precautionary statements

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor

P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

WHMIS classification

B2 - Flammable liquid

D1A - Very toxic material causing immediate and serious toxic effects

D2A - Very toxic material causing other toxic effects

E - Corrosive material

Classification system

HMIS ratings (scale 0-4)

(Hazardous Materials Identification System)

HEALTH

FIRE

REACTIVITY

3

3

2

Health (acute effects) = 3

Flammability = 3

Physical Hazard = 2

Other hazards

Results of PBT and vPvB assessment

PBT: N/A

vPvB: N/A

---

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical characterization: Mixtures

Dangerous components:

110-54-3 n-Hexane

Flam. Liq. 2, H225; Repr. 2, H361; STOT RE 2, H373; Asp. Tox. 1, H304; Skin Irrit. 2, H315; STOT SE 3, H336

54.73%

96-14-0 3-Methylpentane

Flam. Liq. 2, H225; Asp. Tox. 1, H304; Skin Irrit. 2, H315; STOT SE 3, H336

21.05%

10294-34-5 Boron trichloride

Press. Gas, H280; Acute Tox. 2, H300; Acute Tox. 2, H330; Skin Corr. 1B, H314

15.8%

107-83-5 2-Methylpentane

Flam. Liq. 2, H225; Asp. Tox. 1, H304; Skin Irrit. 2, H315; STOT SE 3, H336

4.21%

96-37-7 Methylcyclopentane

Flam. Liq. 2, H225; Skin Irrit. 2, H315; Eye Irrit. 2A, H319; STOT SE 3, H335

4.2092%

Additional information None known.

Non-Hazardous Ingredients

71-43-2 Benzene

Flam. Liq. 2, H225; Muta. 1B, H340; Carc. 1A, H350; STOT RE 1, H372; Asp. Tox. 1, H304; Skin Irrit. 2, H315; Eye Irrit. 2, H319

0.0008%

---

## SECTION 4. FIRST AID MEASURES

Description of first aid measures

General information

Immediately remove any clothing soiled by the product.

Remove breathing apparatus only after contaminated clothing has been completely removed.

In case of irregular breathing or respiratory arrest provide artificial respiration.

If inhaled:

Supply patient with fresh air. If not breathing, provide artificial respiration. Keep patient warm.

Seek immediate medical advice.

In case of skin contact:

Immediately wash with soap and water; rinse thoroughly.

Seek immediate medical advice.

In case of eye contact:

Rinse opened eye for several minutes under running water. Consult a physician.

If swallowed:

Do not induce vomiting; immediately call for medical help.

Information for doctor

Most important symptoms and effects, both acute and delayed

Causes severe skin burns.

Causes serious eye damage.

Indication of any immediate medical attention and special treatment needed:

No data available

---

## **SECTION 5. FIREFIGHTING MEASURES**

Extinguishing media

Suitable extinguishing agents In case of fire, use sand, carbon dioxide or powdered extinguishing agent. Never use water.

For safety reasons unsuitable extinguishing agents Water

Special hazards arising from the substance or mixture

Reacts violently with water

If this product is involved in a fire, the following can be released:

Carbon monoxide and carbon dioxide

Hydrogen chloride (HCl)

Boron oxide

Advice for firefighters

Protective equipment:

Wear self-contained respirator.

Wear fully protective impervious suit.

---

## **SECTION 6. ACCIDENTAL RELEASE MEASURES**

Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

Keep away from ignition sources

Environmental precautions: Do not allow product to enter drains, sewage systems, or other water courses.

Methods and materials for containment and cleanup:

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

Use neutralizing agent.

Dispose of contaminated material as waste according to section 13.

Ensure adequate ventilation.

Do not flush with water or aqueous cleansing agents

Prevention of secondary hazards: Keep away from ignition sources.

Reference to other sections

See Section 7 for information on safe handling

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

---

## **SECTION 7. HANDLING AND STORAGE**

Handling

Precautions for safe handling

Handle under dry protective gas.

Keep container tightly sealed.

Keep away from heat and direct sunlight.

Ensure good ventilation at the workplace.

Open and handle container with care.

Information about protection against explosions and fires:

Protect against electrostatic charges.

Fumes can combine with air to form an explosive mixture.

Keep ignition sources away.

Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles: Refrigerate

Information about storage in one common storage facility:

Protect from heat.

Store away from water/moisture.

Store away from oxidizing agents.

Further information about storage conditions:

Store under dry inert gas.

This product is moisture sensitive.

Protect from humidity and water.

Keep container tightly sealed.

Protect from heat and direct sunlight.

Refrigerate

Specific end use(s) No data available

---

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Additional information about design of technical systems:

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:

110-54-3 n-Hexane (54.73%)

PEL (USA) Long-term value: 1800 mg/m<sup>3</sup>, 500 ppm

REL (USA) Long-term value: 180 mg/m<sup>3</sup>, 50 ppm

TLV (USA) Long-term value: 176 mg/m<sup>3</sup>, 50 ppm

Skin; BEI

EL (Canada) Long-term value: 20 ppm

Skin

EV (Canada) Long-term value: 176 mg/m<sup>3</sup>, 50 ppm

96-14-0 3-Methylpentane (21.05%)

REL (USA) Long-term value: 350 mg/m<sup>3</sup>, 100 ppm

Ceiling limit value: 1800\* mg/m<sup>3</sup>, 510\* ppm

\*15-min

TLV (USA) Short-term value: 3500 mg/m<sup>3</sup>, 1000 ppm

Long-term value: 1760 mg/m<sup>3</sup>, 500 ppm

107-83-5 2-Methylpentane (4.21%)

REL (USA) Long-term value: 350 mg/m<sup>3</sup>, 100 ppm

Ceiling limit value: 1800\* mg/m<sup>3</sup>, 510\* ppm

\*15-min

TLV (USA) Short-term value: 3500 mg/m<sup>3</sup>, 1000 ppm

Long-term value: 1760 mg/m<sup>3</sup>, 500 ppm

96-37-7 Methylcyclopentane (4.2092%)

REL (USA) Long-term value: 350 mg/m<sup>3</sup>, 100 ppm

Ceiling limit value: 1800\* mg/m<sup>3</sup>, 510\* ppm

\*15-min

TLV (USA) Short-term value: 3500 mg/m<sup>3</sup>, 1000 ppm

Long-term value: 1760 mg/m<sup>3</sup>, 500 ppm

71-43-2 Benzene (0.0008%)

PEL (USA) Short-term value: 15\* mg/m<sup>3</sup>, 5\* ppm

Long-term value: 3\* mg/m<sup>3</sup>, 1\* ppm

\*table Z-2 for exclusions in 29CFR1910.1028(d)

REL (USA) Short-term value: 1 ppm

Long-term value: 0.1 ppm

See Pocket Guide App. A

TLV (USA) Short-term value: 8 mg/m<sup>3</sup>, 2.5 ppm

Long-term value: 1.6 mg/m<sup>3</sup>, 0.5 ppm

Skin; BEI

EL (Canada) Short-term value: 2.5 ppm

Long-term value: 0.5 ppm

Skin; ACGIH A1; IARC 1

EV (Canada) Short-term value: 2.5 ppm

Long-term value: 0.5 ppm

Skin

Ingredients with biological limit values:

110-54-3 n-Hexane (54.73%)

BEI (USA) 0.4 mg/L

Medium: urine

Time: end of shift at end of workweek

Parameter: 2,5-Hexanedione without hydrolysis

71-43-2 Benzene (0.0008%)

BEI (USA) 25 µg/g creatinine

Medium: urine

Time: end of shift Parameter

Parameter: S-Phenylmercapturic acid (background

500 µg/g creatinine

Medium: urine

Time: end of shift

Parameter: t,t-Muconic acid (background)

Additional information: No data

Exposure controls

Personal protective equipment

Follow typical protective and hygienic practices for handling chemicals.

Keep away from foodstuffs, beverages and feed.

Remove all soiled and contaminated clothing immediately.

Wash hands before breaks and at the end of work.

Store protective clothing separately.

Do not inhale dust / smoke / mist.

Avoid contact with the eyes and skin.

Maintain an ergonomically appropriate working environment.

Breathing equipment: Use self-contained respiratory protective device in emergency situations.

Recommended filter device for short term use:

Use a respirator with organic vapor/acid gas cartridges as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards such as NIOSH (USA) or CEN (EU).

Protection of hands:

Impervious gloves

Inspect gloves prior to use.

The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

Eye protection:

Tightly sealed goggles  
Full face protection  
Body protection: Protective work clothing.

---

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance:

Form: Liquid

Color: Colorless

Odor: Not determined

Odor threshold: Not determined.

pH: Not determined.

Melting point/Melting range: Not determined

Boiling point/Boiling range: Not determined

Sublimation temperature / start: Not determined

Flash point: -23 °C (-9 °F) (Hexane)

Flammability (solid, gas) Not determined.

Ignition temperature: 240 °C (464 °F)

Decomposition temperature: Not determined

Autoignition: Product is not selfigniting.

Danger of explosion: Product is not explosive. However, formation of explosive air/vapor mixtures is possible.

Explosion limits:

Lower: 1.2 Vol %

Upper: 7.7 Vol %

Vapor pressure at 20 °C (68 °F): 160 hPa (120 mm Hg)

Density at 20 °C (68 °F): 0.738 g/cm<sup>3</sup> (6.159 lbs/gal)

Relative density Not determined.

Vapor density Not determined.

Evaporation rate Not determined.

Solubility in / Miscibility with

Water: Reacts violently

Partition coefficient (n-octanol/water): Not determined.

Viscosity:

Dynamic: Not determined.

Kinematic: Not determined.

Solvent content:

Organic solvents: 54.7 %

Other information No data available

Additional information This product may form a precipitate.

---

## SECTION 10. STABILITY AND REACTIVITY

Reactivity Reacts violently with water.

Chemical stability Stable under recommended storage conditions.

Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions

Reacts with strong oxidizing agents

Reacts violently with water

Conditions to avoid No data available  
Incompatible materials:  
Oxidizing agents  
Water/moisture  
Heat  
Hazardous decomposition products:  
Carbon monoxide and carbon dioxide  
Hydrogen chloride (HCl)  
Boron oxide  
Additional information: This product may form a precipitate.

---

## SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity:

Fatal if swallowed.

Toxic if inhaled.

Swallowing will lead to a strong corrosive effect on mouth and throat and to the danger of perforation of esophagus and stomach.

The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for components in this product.

LD/LC50 values that are relevant for classification:

110-54-3 n-Hexane

Oral LD50 15840 mg/kg (rat)

Inhalative LC50/4H 48000 ppm/4H (rat)

Skin irritation or corrosion: Causes severe skin burns.

Eye irritation or corrosion: Causes serious eye damage.

Sensitization: No sensitizing effects known.

Germ cell mutagenicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for components in this product.

Carcinogenicity:

EPA-I: Data are inadequate for an assessment of human carcinogenic potential.

EPA-II: Inadequate information to assess carcinogenic potential.

The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for components in this product.

Reproductive toxicity:

Suspected of damaging fertility or the unborn child.

The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive data for components in this product.

Specific target organ system toxicity - repeated exposure:

May cause damage to the peripheral nervous system, the lung, the kidneys, the liver, the reproductive system and the brain through prolonged or repeated exposure. Route of exposure: Inhalative.

Specific target organ system toxicity - single exposure: May cause respiratory irritation.

Aspiration hazard: May be fatal if swallowed and enters airways.

Subacute to chronic toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.

Additional toxicological information:

To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

The product shows the following dangers according to internally approved calculation methods for preparations:

Corrosive

Very toxic



---

## SECTION 12. ECOLOGICAL INFORMATION

### Toxicity

Aquatic toxicity: No data available

Persistence and degradability No data available

Bioaccumulative potential No data available

Mobility in soil No data available

Additional ecological information:

Do not allow product to reach groundwater, water courses, or sewage systems.

Danger to drinking water if even small quantities leak into the ground.

Also poisonous for fish and plankton in water bodies.

Toxic to aquatic life.

May cause long lasting harmful effects to aquatic life.

Avoid transfer into the environment.

Results of PBT and vPvB assessment

PBT: N/A

vPvB: N/A

Other adverse effects No data available

---

## SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Recommendation Consult official regulations to ensure proper disposal.

Uncleaned packagings:

Recommendation: Disposal must be made according to official regulations.

---

## SECTION 14. TRANSPORT INFORMATION

UN-Number

DOT, IMDG, IATA UN3286

UN proper shipping name

DOT Flammable liquid, toxic, corrosive, n.o.s. (Boron trichloride, Hexanes)

IMDG, IATA FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S. (BORON TRICHLORIDE, HEXANES)

Transport hazard class(es)

DOT

Class 3 Flammable liquids.

Label 3+6.1+8

Class 3 (FTC) Flammable liquids

Label 3+6.1+8

IMDG, IATA

Class 3 Flammable liquids.

Label 3+6.1+8

Packing group

DOT, IMDG, IATA II

Environmental hazards:

Marine pollutant (IMDG): No

Special precautions for user Warning: Flammable liquids

EMS Number: F-E,S-C

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code N/A

Transport/Additional information:

DOT

Marine Pollutant (DOT): No

UN "Model Regulation": UN3286, Flammable liquid, toxic, corrosive, n.o.s. (Boron trichloride, Hexanes), 3 (6.1+8), II

---

## SECTION 15. REGULATORY INFORMATION

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

GHS label elements, including precautionary statements

Hazard pictograms

GHS02 GHS05 GHS06 GHS08

Signal word Danger

Hazard-determining components of labeling:

Boron trichloride

n-Hexane

3-Methylpentane

Hazard statements

H225 Highly flammable liquid and vapor.

H300 Fatal if swallowed.

H331 Toxic if inhaled.

H314 Causes severe skin burns and eye damage.

H361 Suspected of damaging fertility or the unborn child.

H336 May cause drowsiness or dizziness.

H373 May cause damage to the peripheral nervous system, the lung, the kidneys, the liver, the reproductive system and the brain through prolonged or repeated exposure. Route of exposure: Inhalative.

H304 May be fatal if swallowed and enters airways.

Precautionary statements

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor

P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

National regulations

All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.

All components of this product are listed on the Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)

110-54-3 n-Hexane 54.73%

10294-34-5 Boron trichloride 15.8%

71-43-2 Benzene 0.0008%

California Proposition 65

Prop 65 - Chemicals known to cause cancer

71-43-2 Benzene 0.0008%

Prop 65 - Developmental toxicity

71-43-2 Benzene 0.0008%

Prop 65 - Developmental toxicity, female

None of the ingredients are listed.

Prop 65 - Developmental toxicity, male

71-43-2 Benzene 0.0008%

Information about limitation of use: For use only by technically qualified individuals.

Other regulations, limitations and prohibitive regulations

Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.

None of the ingredients are listed.

The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.

None of the ingredients is listed.

Annex XIV of the REACH Regulations (requiring Authorisation for use)

None of the ingredients is listed.

Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

---

## 16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. American Elements shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. COPYRIGHT 1997-2022 AMERICAN ELEMENTS. LICENSED GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY.