

Safety Data Sheet – Anhydrous Boric Acid

SECTION 1. Identification

1.1. Product identifier

Anhydrous Boric Acid

Index No 005-008-00-8

CAS 1303-86-2

ECN 215-125-8

REACH Registration number: 01-2119486655-24-0003

Trade names: Boron Oxide

Chemical name/synonyms: Boron trioxide, diboron trioxide, anhydrous boric acid, boric oxide

1.2. Details of the supplier of the safety data sheet

Supplier name: American Borate Company

Address: 5701 Cleveland Street, Suite 350, Virginia Beach, VA 23462

Phone No: (757) 490-2242 or (800)-486-1072

1.3. Emergency phone numbers:

Monday through Friday 8am – 5pm EST: (757) 490-2242 or (800) 486-1072

After 5pm and weekends: CHEMTREC 1-800-424-9300

1.4. Recommended use of the chemical and restrictions on uses advised against

The product is used in industrial manufacturing, in particular in:

Ceramics

Detergent

Borosilicate glass

Textile fiberglass

There is no restriction on use of chemical.

SECTION 2. Hazard Identification

2.1. Classification of the substance

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Reproductive toxicity (Category 2), H361

Acute Oral (Category 5), H303

2.2 GHS Label elements

Pictogram

Signal word

Warning



Hazard statements

H361 Suspected of damaging fertility or the unborn child.

H303 May be harmful if swallowed.

Precautionary statements

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P281 Use personal protective equipment as required.

P308/P313 If exposed or concerned: Get medical advice/ attention.

P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

For Full text of R-S phrases as well as Hazard Class/Statements and Precautionary Statements see section 16.

Emergency overview

Anhydrous boric acid is a white odorless, powdered substance that is not flammable, combustible, or explosive, and has low acute oral and dermal toxicity.

Potential health effects

Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because boron oxide is poorly absorbed through intact skin.

Inhalation

Occasional mild irritation effects to nose and throat may occur from inhalation of boron oxide dusts at levels higher than 10 mg/m³.

Eye contact

Anhydrous boric acid is non-irritating to eyes in normal industrial use.

Skin contact

Anhydrous boric acid does not cause irritation to intact skin.

Ingestion

Products containing anhydrous boric acid are not intended for ingestion. Anhydrous boric acid has a low acute toxicity. Small amounts (e.g., a teaspoon) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms.

Reproductive/developmental

Animal ingestion studies in several species, at high doses, indicate that borates cause reproductive and developmental effects. A human study of occupational exposure to borate dust showed no adverse effect on reproduction. A recent epidemiological study and a peer reviewing report of the past epidemiological studies conducted in China didn't show any negative effect of boron on human fertility (10, 11).

Potential ecological effects

Large amounts of anhydrous boric acid can be harmful to plants and other species. Therefore, releases to the environment should be minimized.

Signs and symptoms of exposure

Symptoms of accidental over-exposure to anhydrous boric acid have been associated with ingestion or absorption through large areas of damaged skin. These may include nausea, vomiting and diarrhea, with delayed effects of skin redness and peeling.

Refer to section 11 for details on Toxicological data.

SECTION 3. Composition/ Information on Ingredients

3.1. Substances:

The product contains greater than 98 percent (%) boron oxide (B₂O₃).

Chemical Name	Purity	CAS	ECN	REACH Registration No.	Hazard Statement
Boron Oxide	98 %	1303-86-2	215-125-8	01-2119486655-24-0003	H361 / H303

For other Chemical inventory listings, please refer to section 15.

SECTION 4. First-aid Measures

4.1. Description of first aid measures

General advice

Move out of dangerous area. Seek medical attention. Show this safety data sheet to the doctor in attendance.

Skin contact

Wash with soap and water. Seek medical attention.

Eye contact

As with any chemical exposure to the eye, flush eyes with water for at least 20-minutes. Seek medical attention.

Inhalation

If symptoms such as nose or throat irritation are observed, remove person to fresh air. If not breathing, give artificial respiration. Seek medical attention.

Ingestion

If large amounts are swallowed (i.e. more than one teaspoon), give two glasses of water or milk to drink and seek medical attention. Never give anything by mouth to an unconscious person.

Note to physicians

Observation only is required for adult ingestion of less than 6 grams of anhydrous boric acid. For ingestion in excess of 6 grams, maintain adequate kidney function and force fluids. Gastric lavage is recommended for symptomatic patients only. Hemodialysis should be reserved for massive acute ingestion or patients with renal failure. Boron analyses of urine or blood are only useful for documenting exposure and should not be used to evaluate severity of poisoning or to guide treatment (1) (see section 11).

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

Described in labelling.

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

No data available.

SECTION 5. Fire-fighting Measures Identification

5.1. Suitable extinguishing media

Use fire extinguishing media suitable for surrounding fires.

5.2. Specific hazards arising from the chemical

None, anhydrous boric acid is non-flammable, combustible or explosive. The product is itself a flame retardant.

5.3. Special protective actions for fire-fighters

Firefighters should wear pressure demand, self-contained breathing apparatus and full turn-out gear.

SECTION 6. Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing dust. In case of exposure to prolonged or high level of airborne dust, wear a personal respirator in compliance with national legislation.

6.2. Environmental precautions

Anhydrous boric acid is a water-soluble white powder that may, at high concentrations cause damage to trees or vegetation by root absorption (see section 12). Do not flush to drains.

6.3. Methods and materials for containment and cleaning up

Land spill

Vacuum, shovel or sweep up boron oxide and place in containers for disposal in accordance with applicable local, state, and federal laws and regulations. Avoid contamination of water bodies during clean up and disposal. Avoid breathing dust.

Spillage into water

Where possible, remove any intact containers from the water. Advise local water authority that none of the affected water should be used for irrigation or for the abstraction of potable water until natural dilution returns the boron value to its normal environmental background level (see sections 12, 13 and 15).

6.4. Reference to other sections

See sections 8 and 13 for further information.

SECTION 7. Handling and Storage

7.1. Precautions for safe handling

To maintain package integrity and to minimize caking of the product, bags should be handled on a first-in first out basis. Good housekeeping and dust prevention procedures should be followed to minimize dust generation and accumulation. Use with appropriate local exhaust ventilation. The product should be kept away from strong reducing agents. Apply above handling advice when mixing with other substances.

7.2. Conditions for safe storage

Keep containers closed and store indoors in a dry well ventilated location. Provide appropriate ventilation and store bags such as to prevent any accidental damage.

7.3. Specific end use

See section 1.4.

SECTION 8. Exposure Controls/Personal Protection

8.1. Control parameters

Occupational exposure limits for dust (total and respirable) are treated by OSHA, Cal OSHA and ACGIH as "Particulate Not Otherwise Classified" or "Nuisance Dust"

Respect regulatory provisions for dust (total and respirable).

ACGIH/TLV	10 mg/m ³
Cal OSHA/PEL	10 mg/m ³
OSHA/PEL (total dust)	15 mg/m ³
OSHA/PEL (respirable dust)	5 mg/m ³

DNEL values

Exposure pattern	Type/site of effect	Exposure route	DNEL value
DNELs for workers			
Long-term	Systemic	Inhalation	1.45 mg BA/m ³
Long-term	Systemic	Dermal	4800 mg BA/day
DNELs for the general public			
Acute	Systemic	Oral	0.17 mg BA/kg bw/day
Long-term	Systemic	Dermal (external)	34.3 mg BA/kg bw/day
Long-term	Systemic	Dermal (systemic)	0.17 mg BA/kg bw/day
Long-term	Systemic	Inhalation	0.73 mg BA/m ³
Long-term	Systemic	Oral	0.17 mg BA/kg bw/day

Source: Chemical Safety Report of Boron oxide

PNEC values

PNEC_{add, freshwater, marine water} = 1.35 mg B/L

PNEC_{add aqua intermittent} = 9.1 mg B/L

PNEC add freshwater sediment, marine water sediment = 1.8 mg B/kg sediment dry weight

PNEC add, STP = 1.75 mg B/L

Source: Chemical Safety Report of Boric Acid

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Maintain air concentrations below occupational exposure standards.

Use local exhaust ventilation to keep airborne concentrations of anhydrous boric acid dust below permissible exposure levels. Wash hands before breaks and at the end of the workday. Remove and wash soiled clothing.

8.2.2. Individual protection measures, such as personal protective equipment

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Eyes and hand protection

Handle with gloves. Wear eye protection suitable for job tasks.

8.2.3. Environmental exposure controls

No special requirement.

SECTION 9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical state		powder or solid
Color		white
Odor		odorless
Odor threshold		no data available
Molecular weight		69.6 g/mol
Specific gravity		2.04 gr/cm ³
pH @ 20°C		4.4 (1.0% solution)
Melting point		450 – 465 °C (heated in closed space)
Initial boiling point and boiling range		no data available
Flash point		not flammable
Evaporation rate		not applicable
Flammability (solid, gas)		not applicable
Upper/lower flammability or explosive limits		not applicable
Vapor pressure		negligible 20@°C
Vapor density		not applicable
Relative density		2.04 gr/cm ³ @ 20°C
Solubility in water		4.0 % @ 20 °C
Partition coefficient :n-octanol/water		Log Pow = -0.7570 @ 25°C
Auto-ignition temperature		not applicable
Decomposition temperature		no data available
Viscosity		not applicable
Explosion hazard		not explosive not
Oxidizing properties		applicable
Bulk density:	Granular	49.94 lbs/ft ³ (0.80 ton/m ³)
	Powder	37.46 lbs/ft ³ (0.60 ton/m ³)

SECTION 10. Stability and Reactivity

10.1. Reactivity

No data available

10.2. Chemical stability

Anhydrous boric acid is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3. Possibility of hazardous reactions

Reaction with strong reducing agents such as metal hydrides or alkali metals will generate flammable hydrogen gas which could create an explosive hazard.

10.4. Conditions to avoid:

Exposure to moisture and incompatible materials.

10.5. Incompatible materials

Anhydrous boric acid (with exposure to atmospheric moisture) reacts as a weak acid which may cause corrosion of base metals. Avoid contact with strong reducing agents such as metal hydrides or alkali metals.

10.6. Hazardous decomposition products

Boranes, hydrogen, boron oxides.

SECTION 11. Toxicological Information

11.1. Information on toxicological effect

11.1.1. Substances

Acute toxicity

Low acute oral toxicity; LD₅₀ in rats is 1,970 to 2,100 mg/kg of body weight.

Skin corrosion / irritation

Low acute dermal toxicity; LD₅₀ in rabbits is greater than 2,000 mg/kg of body weight. Boron oxide is poorly absorbed through intact skin. Non-irritant.

Serious eye damage/ irritation

Non-irritating

Respiratory or skin sensitization

Boron oxide is not a skin sensitizer.

Germ cell mutagenicity / carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

Animal feeding studies in rat, mouse and dog, at high doses, have demonstrated effects on fertility and testes (2). Studies in rat, mouse and rabbit, at high doses, demonstrate developmental effects on the fetus including fetal weight loss and minor skeletal variations. The doses administered were many times in excess of those which humans would normally be exposed to (3, 4, 5). Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid dust and sodium borate dust. A recent epidemiology study under the conditions of normal occupational exposure to borate dusts indicated no effect on fertility.

STOT-single exposure

N.A.

STOT-repeated exposure

N.A.

Aspiration hazard

Low acute inhalation toxicity; LC₅₀ in rats is greater than 2.0 mg/l (or g/m³).

SECTION 12. Ecological Information

Boron occurs naturally in sea water at an average concentration of 5 mg B/l and fresh water at 1 mg B/l or less. In dilute aqueous solutions the predominant boron species present is un-dissociated boric acid. To convert anhydrous boric acid into equivalent boron (B) content, multiply by 0.3105. Not persistent, not bio-accumulative.

12.1. Toxicity

Phytotoxicity

Boron is an essential micronutrient for healthy growth of plants; however, it can be harmful to boron sensitive plants in higher quantities. Care should be taken to minimize the amount of borate product released to the environment.

Algal toxicity (6)

Green algae, *Pseudokirchneriella subcapitata* (Hansveit and Oldersma, 2000)
72-hr EC₅₀ –biomass = 40 mg B/L, or 229 mg boric acid/L.

Invertebrate toxicity (7)

Daphnia, Daphnids, *Daphnia magna* (Gersich, 1984a)
48-hr LC₅₀ = 133 mg B/L or 760 mg boric acid/L or 619 mg disodium tetraborate, anhydrous/L

Fish toxicity (8)

Fish, Fathead minnow, *Pimephales promelas* (Soucek et al., 2010)
96-hr LC₅₀ = 79.7 mg B/L or 456 mg boric acid/L or 370 mg disodium tetraborate, anhydrous

12.2. Persistence and degradability

Boron is naturally occurring and ubiquitous in the environment. Boron oxide decomposes in the environment to natural borate.

Boron oxide reacts with water to form boric acid. Heat of hydration to boric acid 75.94 kJ/mol

12.3. Bio-accumulative potential

Not significantly bio-accumulative.

12.4. Mobility in soil

The product is soluble in water and is leachable through normal soil.

12.5. Results of PBT and vPvB assessment

No data available

12.6. Other adverse effects

No data available

SECTION 13. Disposal Considerations

13.1. Disposal methods

Dispose of in accordance with all local, state, and federal regulations. Contact a licensed waste disposal service to dispose of this material. Surplus product should, if possible, be used for an appropriate application.

SECTION 14. Transport Information

Anhydrous boric acid has no UN Number, and is not regulated under international rail, road, water or air transport regulations.

US DOT

Not dangerous goods

IMDG

Not dangerous goods

IATA

SECTION 15. Regulatory Information

15.1. Safety, health and environmental regulations/substance specific legislation

It should be noted that borates are safe under conditions of normal handling and use, besides, they are essential nutrients to plants, and research shows that they play a beneficial role in human health.

Chemical inventory listing

U.S. EPA TSCA Inventory	1303-86-2
Canadian DSL	1303-86-2
EINECS	215-125-8
South Korea	1-63
Japanese MITI	(1)-69

Ensure all national/local regulations are observed.

SARA 302 No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards Chronic Health Hazard

Massachusetts Right To Know Components

Diboron trioxide CAS-No. 1303-86-2 Revision Date 1993-04-24

Pennsylvania Right To Know Components

Diboron trioxide CAS-No. 1303-86-2 Revision Date 1993-04-24

New Jersey Right To Know Components

Diboron trioxide CAS-No. 1303-86-2 Revision Date 1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Clean Air Act (Montreal Protocol)

Anhydrous boric acid was not manufactured with and does not contain any Class I or Class II ozone depleting substances.

EU Reach Regulation

Anhydrous boric acid is listed in the Candidate List of Substances of Very High Concern "SVHC" for eventual inclusion in Annex XIV to REACH Regulation 1907/2006 ("Authorization List"). (18.06.2010-ED/30/2010).

Anhydrous boric acid is listed in the Annex XVII of REACH Regulation 1907/2006 (EU No.109/2012) and its use in consumer products above specific concentration limits is restricted. Note that this restriction is only specific to consumer products and do not cover its industrial and/or professional applications. Anhydrous boric acid can be used in consumer products below specific concentration limits (which is $C \geq 3.1\%$ for Boron oxide).

SECTION 16. Other Information

Full text of H-Statements referred to under sections 2 and 3.

H361 Suspected of damaging fertility or the unborn child

H303 May be harmful if swallowed.

References

1. Litovitz T L, Norman S A, Veltri J C, Annual Report of the American Association of Poison Control Centers Data Collection System. Am. J. Emerg. Med. (1986), 4, 427-458
2. Weir R J, Fisher R S, Toxicol. Appl. Pharmacol., (1972), 23, 351-364
3. National Toxicology Program (NTP) – Technical Report Series No. TR324, NIH Publication No. 88-2580 (1987), PB88 213475/XAB
4. Fail *et al.*, Fund. Appl. Toxicol. (1991) 17, 225-239
5. Heindel *et al.*, Fund. Appl. Toxicol. (1992) 18, 266-277
6. Hansveit and Oldersma, 2000; TNO Nutrition and Food Research Institute. Report No. V99.157.
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8. Soucek *et al.*, 2010. Illinois Natural History Survey, University of Illinois.
9. Birge W J, Black J A, EPA-560/-76-008 (April 1977) PB 267 085
10. Scialli AR, Bonde JP, Brüske-Hohlfeld I, Culver D, Li Y, Sullivan FM; ELSEVIER 2009
11. Robbins WA, Xun L, Jia J, Kennedy N, Elashoff DA, Ping L. ;ELSEVIER 2009;(Reproductive Toxicology)

For general information on the toxicology of borates see ECETOC Technical Report No. 63 (1995); Patty's Industrial Hygiene and Toxicology, 4th Edition Vol. II, (1994) Chap. 42, Boron.

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