

SAFETY DATA SHEETS

According to Globally Harmonized System of Classification and Labelling of Chemicals (GHS) - Sixth revised edition

Version: 1.0

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1. Identification

1.1 GHS Product identifier

Product name Boric acid

1.2 Other means of identification

Product number -

Other names -

1.3 Recommended use of the chemical and restrictions on use

Identified uses For industry use only. Enzymes and Enzyme Stabilizers

Uses advised against no data available

2. Hazard identification

2.1 Classification of the substance or mixture

Reproductive toxicity, Category 1B

2.2 GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H360FD

Precautionary

statement(s)

Prevention

P201 Obtain special instructions before use.

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

P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response

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

Storage

P405 Store locked up.

Disposal

P501 Dispose of contents/container to ...

2.3 Other hazards which do not result in classification

none

3. Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
Boric acid	Boric acid	11113-50-1	none	100%

4. First-aid measures

4.1 Description of necessary first-aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

Fresh air, rest.

In case of skin contact

Rinse and then wash skin with water and soap.

In case of eye contact

Rinse with plenty of water (remove contact lenses if easily possible).

If swallowed

Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention.

4.2 Most important symptoms/effects, acute and delayed

Although no adverse effects have been reported from inhaling boric acid dust, it is absorbed through mucous membranes. Ingestion of 5 grams or more may irritate gastrointestinal tract and affect central nervous system. Contact with dust or aqueous solutions may irritate eyes; no chronic effects have been recognized, but continued contact should be avoided. Dust and solutions are absorbed through burns and open wounds but not through unbroken skin. (USCG, 1999)

4.3 Indication of immediate medical attention and special treatment needed, if necessary

The diagnoses of boric acid poisoning can be confirmed with the measurement of blood or serum boric acid levels ($nL=1.4 \text{ nmol/mL}$), but this test is not routinely available. Treatment of boric acid toxicity is mainly supportive. Activated charcoal is not recommended because of its relatively poor adsorptive capacity for boric acid. In cases of massive oral overdose or renal failure, hemodialysis, or perhaps exchange transfusion in infants, may be helpful in shortening the half-life of boric acid.

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media

Fire Extinguishing Agents: Water fog. (USCG, 1999)

5.2 Specific hazards arising from the chemical

Literature sources indicate that this compound is nonflammable.

5.3 Special protective actions for fire-fighters

Wear self-contained breathing apparatus for firefighting if necessary.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions

Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Wash away remainder with plenty of water.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. Handling and storage

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Avoid exposure - obtain special instructions before use. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Separated from strong bases. Preserve in well-closed containers.

8. Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

no data available

Biological limit values

no data available

8.2 Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash

hands before breaks and at the end of workday.

8.3 Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Wear impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Respiratory protection

Wear dust mask when handling large quantities.

Thermal hazards

no data available

9. Physical and chemical properties

Physical state	Boric acid is an odorless white solid. Melting point 171°C. Sinks and mixes with water. (USCG, 1999)
Colour	Colorless, transparent crystals or white granules or powder
Odour	Odorless
Melting point/ freezing point	170.9°C
Boiling point or initial boiling point and boiling range	300°C at 760 mm Hg (decomposes)
Flammability	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.
Lower and upper	no data available

explosion limit / flammability limit	
Flash point	no data available
Auto-ignition temperature	no data available
Decomposition temperature	171°C
pH	3,8-4,8 (3,3 % aqueous solution)
Kinematic viscosity	no data available
Solubility	10 to 50 mg/mL at 18.89°C
Partition coefficient n-octanol/water (log value)	log Kow = 0.175
Vapour pressure	1.6X10 ⁻⁶ mm Hg at 25°C (2.136X10 ⁻⁴ Pa); log P (in Pa) = 26.83 - 9094/T where T is deg K
Density and/or relative density	1.437 g/cm ³
Relative vapour density	no data available
Particle characteristics	no data available

10. Stability and reactivity

10.1 Reactivity

no data available

10.2 Chemical stability

Stable in air.

10.3 Possibility of hazardous reactions

Not flammable BORIC ACID is a very weak acid. Incompatible with alkali carbonates and hydroxides. During an attempt to make triacetyl borate, a mixture of boric acid and acetic anhydride exploded when heated to 58-60°C [Chem. Eng. News 51:(34) 1973]. Reacts violently with the strong reducing agent potassium metal.

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

During an attempt to make triacetyl borate, a mixture of boric acid and acetic anhydride exploded when heated to 58-60°C.

10.6 Hazardous decomposition products

Boric acid decomposes in heat above 100°C forming boric anhydride and water.

11. Toxicological information

Acute toxicity

- Oral: LD50 Rat oral 3000-4000 mg/kg bw
- Inhalation: LC50 Rat inhalation >0.16 mg/L 4hr
- Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

Cancer Classification: Group E Evidence of Non-carcinogenicity for Humans

Reproductive toxicity

no data available

STOT-single exposure

no data available

STOT-repeated exposure

no data available

Aspiration hazard

no data available

12. Ecological information

12.1 Toxicity

- Toxicity to fish: LC50; Species: *Oncorhynchus mykiss* (Rainbow trout); Concentration: 100 ppm for 96 hr (soft water); exposure was initiated subsequent to fertilization and maintained through 4 days posthatching /Conditions of bioassay not specified in source examined
- Toxicity to daphnia and other aquatic invertebrates: LC50; Species: *Daphnia magna* (Water flea); Conditions: static bioassay; Concentration: 133 (115-153) mg/L for 48 hr
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

12.2 Persistence and degradability

No biotransformation processes have been reported for boron compounds(1). Boric acid has been shown to be a mild antiseptic agent with bacteriostatic action(2). A concentration beyond 10 mg/L produces toxicity to activated sludge cultures(3).

12.3 Bioaccumulative potential

Highly water soluble materials are unlikely to bioaccumulate to any significant degree, and borate species are all present essentially as undissociated boric acid at neutral pH(1). The octanol/water partition coefficient for boric acid has been measured as 0.175(1), indicating low bioaccumulation potential(1). Boron did not bioaccumulate in 47-day and 21-day exposure tests using oysters and sockeye salmon respectively(1).

12.4 Mobility in soil

Boric acid adsorption to illite (three-layered clay consisting of two outer layers of hydrated SiO₂ and a central layer of hydrated Al₂O₃) and kaolinite (alternate layers of SiO₂ and Al₂O₃) clays, as well as activated sludge was studied. The compound was added to 100 mL flasks corresponding to a boron concentration range of zero to 256 mg/L. It was observed that kaolinite adsorbed about 40 times ($K_d = 0.199$ (Freundlich adsorption coefficient)) more boric acid than illinite ($K_d = 0.005$) at pH 7; five times as much boric acid adsorbed to activated sludge ($K_d = 0.025$) as to illinite at pH 7(1). Boron adsorption is influenced by the

distribution of boron species (H_3BO_3 ; $B(OH)_4^-$) as well as pH, the type and/or composition of the solution matrix, and surface properties(2). The pKa of boric acid is 9.24(3), indicating that this compound will exist primarily in the undissociated form in the environment, but partially in the anion form in alkaline soils(SRC). However, boric acid is a Lewis acid and therefore behaves as an electron acceptor, rather than a proton donor(3).

12.5 Other adverse effects

no data available

13. Disposal considerations

13.1 Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

14. Transport information

14.1 UN Number

ADR/RID: no data available IMDG: no data available IATA: no data available

14.2 UN Proper Shipping Name

ADR/RID: no data available

IMDG: no data available

IATA: no data available

14.3 Transport hazard class(es)

ADR/RID: no data available IMDG: no data available IATA: no data available

14.4 Packing group, if applicable

ADR/RID: no data available IMDG: no data available IATA: no data available

14.5 Environmental hazards

ADR/RID: no

IMDG: no

IATA: no

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

no data available

15. Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
Boric acid	Boric acid	11113-50-1	none
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Listed.
China Catalog of Hazardous chemicals 2015			Not Listed.
New Zealand Inventory of Chemicals (NZIoC)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Listed.

16. Other information

Information on revision

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Abbreviations and acronyms

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

References

- IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>
 - HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
 - IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>
 - eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
 - CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>
 - ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>
 - ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>
 - Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
 - ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>
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Disclaimer: 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. We as supplier shall not be held liable for any damage resulting from handling or from contact with the above product.