

Boric Acid

1 Chemical product and company identification

Product name: Boric Acid
Grade: Technical, NF, S.Q.
Product use: Industrial manufacturing
Chemical formula: H₃BO₃
Chemical name/synonyms: Boric acid, orthoboric acid, boracic acid
Chemical family: Inorganic borates
CAS registry number: 10043-35-3 (11113-50-1)

(Refer to Section 15 for TSCA/DSL chemical inventory listing)

MANUFACTURER:
U.S. Borax Inc.
26877 Tourney Road
Valencia, CA 91355-1847

EMERGENCY PHONE NUMBERS:
24 Hr. Medical Info. Service (661) 284-5200
Chemtrec (Spills): (800) 424-9300

2 Composition/information on ingredients

This product contains greater than 99 percent (%) boric acid (H₃BO₃), which is hazardous under the OSHA Hazard Communication Standard and under the Canadian Controlled

Products Regulations of the Hazardous Products Act (WHMIS), based on animal chronic toxicity studies. Refer to Sections 3 and 11 for details on hazards.

3 Hazard identification

Emergency overview

Boric Acid is a white, odorless, powder substance that is not flammable, combustible, or explosive and has low acute oral and dermal toxicity.

Potential ecological effects

Large amounts of Boric Acid can be harmful to plants and other species. Therefore, releases to the environment should be minimized.

Potential health effects

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

Inhalation: Occasional mild irritation effects to the nose and throat may occur from inhalation of Boric Acid dust at levels greater than 10 mg/m³.

Eye contact: Boric Acid is non-irritating to the eyes in normal industrial use.

Skin contact: Boric Acid does not cause irritation to intact skin.

Ingestion: Products containing Boric Acid are not intended for ingestion. 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.

Cancer: Boric Acid is not a known carcinogen.

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.

Target organs: No target organ has been identified in humans. High dose animal ingestion studies indicate the testes are the target organs in male animals.

Signs and symptoms of exposure: Symptoms of accidental over-exposure to 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.

4 First aid measures

Inhalation: If symptoms such as nose or throat irritation are observed, remove person to fresh air.

Eye contact: Use eye wash fountain or fresh water to cleanse the eye. If irritation persists for more than 30 minutes, seek medical attention.

Skin contact: No treatment necessary because non-irritating.

Ingestion: Swallowing small quantities (one teaspoon) will cause no harm to healthy adults. If larger amounts are swallowed, give two glasses of water to drink and seek medical attention.

Note to physicians: Observation only is required for adult ingestion in the range of 4-8 grams of Boric Acid. For ingestion of larger amounts, 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 treatment¹. Refer to Section 11 for details.

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5 Firefighting measures

General hazard: None, because Boric Acid is not flammable, combustible or explosive. The product is itself a flame retardant.

Extinguishing media: Any fire extinguishing media may be used on nearby fires.

Flammability classification (29 CFR 1910.1200): Non-flammable solid.

6 Accidental release measures

General: Boric Acid is a water-soluble white powder that may, at high concentrations, cause damage to trees or vegetation by root absorption. (Refer to Ecological information, Section 12, for specific information.)

Land spill: Vacuum, shovel or sweep up Boric Acid and place in containers for disposal in accordance with applicable local regulations. Avoid contamination of water bodies during cleanup and disposal. Personal protective equipment is not needed to cleanup land spills.

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. (Refer to Sections 12, 13 and 15 for additional information.) Boric Acid is a non-hazardous waste when spilled or disposed of, as defined in the Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261). (Refer to Regulatory information, Section 15, for additional references.)

7 Handling and storage

General: No special handling precautions are required, but dry, indoor storage is recommended. To maintain package integrity and to minimize caking of the product, bags should be handled on a first-in, first-out basis. Good housekeeping procedures should be followed to minimize dust generation and accumulation.

Storage temperature: Ambient

Storage pressure: Atmospheric

Special sensitivity: Moisture (caking)

8 Exposure controls/personal protection

Engineering controls: Use local exhaust ventilation to keep airborne concentrations of Boric Acid dust below permissible exposure levels.

Personal protection: Where airborne concentrations are expected to exceed exposure limits, NIOSH/MSHA certified respirators should be used. Eye goggles and gloves are not required for normal industrial exposures, but may be warranted if environment is excessively dusty.

Occupational exposure limits: Boric acid is treated by OSHA and CAL OSHA as "Particulate Not Otherwise Classified" or "Nuisance Dust." Rio Tinto Borax recommends and applies internally an Occupational Exposure Limit (OEL) of 1 mg B/m³.

Cal OSHA/PEL: 10 mg/m³

OSHA/PEL (total dust): 15 mg/m³

OSHA/PEL (respirable dust): 5 mg/m³

9 Physical and chemical properties

Appearance: White, odorless, crystalline solid

Specific gravity: 1.51

Vapor pressure: Negligible @ 20°C

Solubility in water: 4.7% @ 20°C; 27.5% @ 100°C

Melting point: 170.9°C (340°F) (heated in closed space)

pH @ 20°C: 6.1 (0.1% solution); 5.1 (1.0% solution); 3.7 (4.7% solution)

Molecular weight: 61.84

10 Stability and reactivity

General: Boric Acid is a stable product, but when heated it loses water, first forming metaboric acid (HBO₂), and on further heating it is converted into boric oxide (B₂O₃).

Incompatible materials and conditions to avoid: Boric Acid reacts as a weak acid which may cause corrosion of base metals. Reaction with strong reducing agents, such as metal hydrides or alkali metals, will generate hydrogen gas, which could create an explosive hazard.

Hazardous decomposition: None.

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11 Toxicological information

Acute toxicity

Ingestion: Low acute oral toxicity; LD₅₀ in rats is 3,500 to 4,100 mg/kg of body weight.

Skin/dermal: Low acute dermal toxicity; LD₅₀ in rabbits is greater than 2,000 mg/kg of body weight. Boric acid is poorly absorbed through intact skin.

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

Skin irritation: Non-irritant.

Eye irritation: Draize test in rabbits produced mild eye irritation effects. Fifty years of occupational exposure to Boric Acid indicates no adverse effects on human eye. Therefore, Boric Acid is not considered to be a human eye irritant in normal industrial use.

Sensitization: Boric acid is not a skin sensitizer.

Other

Reproductive/developmental toxicity: Animal feeding studies in rat, mouse and dog, at high doses, have demonstrated effects on fertility and testes². Boric acid studies in rat, mouse and rabbit, at high doses, demonstrate developmental effects on the fetus, including fetal weight loss and minor skeletal variations^{3, 4}. The doses administered were many times in excess of those to which humans would normally be exposed⁵.

Carcinogenicity/mutagenicity: No evidence of carcinogenicity in mice⁶. No mutagenic activity was observed for boric acid in a battery of short-term mutagenicity assays.

Human data: 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 fertility⁷.

12 Ecological information

Ecotoxicity data

General: Boron (B) is the element in boric acid which is used by convention to report borate product ecological effects. It occurs naturally in sea-water at an average concentration of 5 mg B/L and generally occurs in fresh water at concentrations up to 1 mg B/L. In dilute aqueous solutions the predominant boron species present is undissociated boric acid. To convert boric acid into equivalent boron (B) content, multiply by 0.1748.

Phytotoxicity: Boron is an essential micronutrient for healthy growth of plants; however, it can be harmful to boron sensitive plants in high quantities. Care should be taken to minimize the amount of Boric Acid released to the environment.

Algal toxicity:

Green algae, *Scenedesmus subspicatus*
96-hr EC₁₀ = 24 mg B/L[†]

Invertebrate toxicity⁸:

Daphnids, *Daphnia magna straus*
48-hr LC₅₀ = 133 mg B/L[‡]
21-day NOEC-LOEC = 6-13 mg B/L[‡]

Test substance: [†] sodium tetraborate
[‡] boric acid

Fish toxicity:

Sea-water⁹:

Dab, *Limanda limanda*
96-hr LC₅₀ = 74 mg B/L[†]

Fresh water¹⁰:

Rainbow trout, *S. gairdneri* (embryo-larval stage)
24-day LC₅₀ = 150 mg B/L[‡]
32-day LC₅₀ = 100 mg B/L[‡]

Goldfish, *Carassius auratus* (embryo-larval stage)
7-day LC₅₀ = 46 mg B/L[‡]
3-day LC₅₀ = 178 mg B/L[‡]

Environmental fate data

Persistence/degradation: Boron is naturally occurring and ubiquitous in the environment. Boric Acid decomposes in the environment to natural borate.

Octanol/water partition coefficient: Log P_{ow}: -0.7570 at 25°C.

Soil mobility: Boric Acid is soluble in water and is leachable through normal soil.

13 Disposal considerations

Disposal guidance: Small quantities of Boric Acid can usually be disposed of at landfill sites. No special disposal treatment is required, but local authorities should be consulted about any specific local requirements. Tonnage quantities of product should, if possible, be used for an appropriate application.

RCRA (40 CFR 261): Boric acid is not listed under any sections of the Federal Resource Conservation and Recovery Act (RCRA).

NPRI (Canada): Boric acid is not listed on the Canadian National Pollutant Release Inventory.

Refer to Section 15 for additional regulatory information.

14 Transport information

DOT hazardous classification: Boric acid is not regulated by the U.S. Department of Transportation (DOT) and is therefore not considered a hazardous material/substance.

TDG Canadian transportation: Boric acid is not regulated under Transportation of Dangerous Goods (TDG).

International transportation: Boric acid has no UN Number, and is not regulated under international rail, road, water or air transport regulations.

15 Regulatory information

OSHA/Cal OSHA: This MSDS document meets the requirements of both OSHA (29 CFR 1910.1200) and Cal OSHA (Title 8 CCR 5194 (g)) hazard communication standards. Refer to Section 8 for regulatory exposure limits.

WHMIS classification: Boric Acid is classified as Class D-Division 2A under Canadian WHMIS guidelines.

Chemical inventory listing: Boric acid (10043-35-3) appears on several chemical inventory lists (including the EPA TSCA inventory, Canadian DSL, European EINECS, Japanese MITI, Australian and Korean lists) under the CAS No. representing the anhydrous form of this inorganic salt.

U.S. EPA TSCA Inventory 10043-35-3

Canadian DSL 10043-35-3

EINECS 233-139-2

South Korea 1-439

Japanese MITI (1)-63

RCRA: Boric acid is not listed as a hazardous waste under any sections of the Resource Conservation and Recovery Act (RCRA) or regulations (40 CFR 261 *et seq.*)

Superfund: CERCLA/SARA. Boric acid is not listed under CERCLA (Comprehensive Environmental Response Compensation and Liability Act) or its 1986 amendments, SARA (Superfund Amendments and Reauthorization Act), including substances listed under Section 313 of SARA, Toxic Chemicals, 42 USC 11023, 40 CFR 372.65, Section 302 of SARA, Extremely Hazardous Substances, 42 USC 11002, 40 CFR 355, or the CERCLA Hazardous Substances list, 42 USC 9604, 40 CFR 302.

Safe Drinking Water Act (SDWA): Boric acid is not regulated under the SDWA, 42 USC 300g-1, 40 CFR 141 *et seq.* Consult state and local regulations for possible water quality advisories regarding boron compounds.

Clean Water Act (CWA) (Federal Water Pollution Control Act): 33 USC 1251 *et seq.*

- 1) Boric acid is not itself a discharge covered by any water quality criteria of Section 304 of the CWA, 33 USC 1314.
- 2) It is not on the Section 307 List of Priority Pollutants, 33 USC 1317, 40 CFR 129.
- 3) It is not on the Section 311 List of Hazardous Substances, 33 USC 1321, 40 CFR 116.

Canadian drinking water guideline: An "Interim Maximum Acceptable Concentration" (IMAC) for boron is currently set at 5 mg B/L.

IARC: The International Agency for Research on Cancer (IARC) (a unit of the World Health Organization) does not list or categorize boric acid as a carcinogen.

NTP Biennial Report on Carcinogens: Boric acid is not listed.

OSHA carcinogen: Boric acid is not listed.

California Proposition 65: Boric acid is not listed on the Proposition 65 list of carcinogens or reproductive toxicants.

Federal Food, Drug and Cosmetic Act: Pursuant to 21 CFR 175.105, 176.180 and 181.30, boric acid is approved by the FDA for use in adhesive components of packaging materials, as a component of paper coatings on such materials, or for use in the manufacture thereof, which materials are expected to come in contact with dry food products.

Clean Air Act (Montreal Protocol): Boric acid was not manufactured with and does not contain any Class I or Class II ozone depleting substances.

16 Other information

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.* **4**: 427-458 (1986).
2. Weir R J, Fisher R S, *Toxicol. Appl. Pharmacol.* **23**: 351-364 (1972).
3. Fail *et al.*, *Fund. Appl. Toxicol.* **17**: 225-239 (1991).
4. Price *et al.*, *J. Am. Coll. Toxicol.* **14**: (2), 173 (Abst. P-17) (1995).
5. Murray F J, *Regul. Toxicol. Pharmacol.* (Dec. 1995).
6. National Toxicology Program (NTP)-Toxicology and carcinogenesis studies of boric acid in B6C3F₁ mice, Tech. Report Ser. No. 324, U.S. Dept. of Health and Human Services. NIH Publ. No. 88-2580 (1987).
7. Whorton *et al.*, *Occup. Environ. Med.* **51**: 761-767 (1994).
8. Schöberl *et al.*, *Tenside Surfactants Detergents* **25**: 99-107 (1988).
9. Hugman S J, Mance G, Water Research Centre Report 616-M (1983).
10. Butterwick L, de Oude N, Raymond K, *Ecotoxicol. Environ. Safety* **17**: 339-371 (1989).

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

Product label text hazard information*:

- Do not ingest.
- Ingestion may cause reproductive harm or birth defects based on animal data.
- Avoid contamination of food or feed.
- Not for use in food, drug, or pesticides⁺.
- Refer to MSDS.
- KEEP OUT OF REACH OF CHILDREN.

*The WHMIS panel format is used for Canadian product.

⁺Except for NF (pharmaceutical grade) products.

National Fire Protection Assoc. (NFPA) classification:

Health	0
Flammability	0
Reactivity	0

Hazardous Materials Information Systems (HMIS):

Red: (Flammability)	0
Yellow: (Reactivity)	0
Blue: (Acute Health)	1*

*Chronic Effects

For further information contact:

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