



# BORIC ACID

## Material Safety Data Sheet



Manufactured by:  
**IMC Chemicals Inc.**  
 8300 College Boulevard, Overland Park, Kansas 66210

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### CHEMICAL PRODUCT & COMPANY IDENTIFICATION

**PRODUCT NAME:** Boric Acid  
**MANUFACTURER:**  
 IMC Chemicals Inc.  
 8300 College Boulevard  
 Overland Park, Kansas 66210

**EMERGENCY PHONE NUMBER:**  
 24 Hour Information Service: 760-372-2291  
 CHEMTREC: 800-424-9300  
**PREPARATION/REVISION DATE:** February 15, 2001  
 Supersedes August 18, 1999 Version

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### COMPOSITION/INFORMATION ON INGREDIENTS

**NOTE:** See Section 15 for Exposure Limits.

**PRODUCT NAME:** Boric Acid  
**FORMULA:** H<sub>3</sub>BO<sub>3</sub>  
**CHEMICAL NAME:** Boric Acid  
**SYNONYMS:** OrthoBoric Acid, Boracic Acid

**COMPONENTS:**  
 Material: Boric Acid  
 CAS Number: 10043-35-3  
 Percent: 99.755%

Boric Acid is hazardous under the OSHA Hazard Communication Standard based on animal chronic toxicity studies of similar organic Borates; see Section 11 for details on Toxicological Data.

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### HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW:** Boric Acid is a white odorless, powdered substance that is not flammable, combustible, or explosive, and it presents no unusual hazard if involved in a fire. Boric Acid presents little or no hazard (to humans) and has low acute oral and dermal toxicities. Care should be taken to minimize the amount of Boric Acid released to the environment to avoid ecological effects.

**ROUTES OF EXPOSURE:** In the occupational setting, inhalation is the most important route of exposure. Dermal absorption is usually not important because Boric Acid is not absorbed through the intact skin.

**INHALATION:** Mild irritation to nose and throat may occur when the PEL or TLV are exceeded (see Section 15).

**EYE CONTACT:** Exposure to Boric Acid dust does not cause eye irritation in normal industrial use.

**DERMAL CONTACT:** Boric Acid is non-irritating to the intact skin. Can be readily absorbed through broken or abraded skin.

**INGESTION:** Boric Acid products are not intended for ingestion. Amounts greater than one teaspoonful, when ingested, may cause gastrointestinal problems.

**CANCER:** Boric Acid is not considered a carcinogen.

**REPRODUCTIVE:** A human study of occupationally exposed Borate worker population showed no adverse reproductive effects. Animal studies of similar organic Borates demonstrated reproductive effects in males.

**TARGET ORGANS:** No target organs have been determined in humans. High dose animal ingestion studies indicate that the testes is the target organ.

**SIGNS AND SYMPTOMS OF EXPOSURE:** Symptoms of accidental over-exposure to Boric Acid have been associated with ingestion or by absorption through large areas of damaged skin. These may include nausea, vomiting, and diarrhea, with delayed effects of skin redness and peeling.

See Section 11 for details on Toxicological Data.

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### EMERGENCY & FIRST AID PROCEDURES

**EYES:** Continuously flush exposed eyes, occasionally lifting the upper and lower lids. Get medical attention if irritation persists.

**SKIN:** Boric Acid is non-irritating in the normal occupational setting. If irritation occurs, wash affected area with soap or mild detergent and large amounts of water. Get medical attention if irritation persists.

**INHALATION:** No specific treatment is necessary since Boric Acid is not likely to be hazardous by inhalation. Prolonged exposure to dust levels in excess of regulatory limits should always be avoided.

**INGESTION:** If amounts greater than one teaspoon are swallowed, give two glasses of water to drink and seek medical attention.

**NOTE TO PHYSICIAN:** Adult ingestion of a few grams requires observation only. 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. Boric Acid analysis of urine or blood is useful only for documenting exposure and should not be used for evaluating severity of poisoning or to guide treatment. [additional reference: Litovitz, T.L., Norman, S.A., Veltri, J.C., Annual Report of the American Association of Poison Control Centers Data Collection system. Am J. of Emergency Med. 1986; 4:427-458.]

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**FIRE FIGHTING MEASURES**

**GENERAL HAZARD:** Boric Acid is not flammable, combustible, or explosive. Boric Acid presents no unusual hazards when involved in a fire. This product is an inherent fire retardant.  
**UEL/LEL:** Not Applicable  
**FLASH POINT:** Not Applicable

**AUTOIGNITION TEMPERATURE:** Not Applicable  
**FLAMMABILITY CLASSIFICATION:** Flammability Classification (29 CFR 1910.1200), Non-flammable solid.  
**EXTINGUISHING MEDIA:** Any fire extinguishing media may be used on nearby fires.

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**ACCIDENTAL RELEASE MEASURES**

**ACTION TO TAKE FOR SPILLS OR LEAKS:** Boric Acid may damage trees and vegetation (see Ecological Information, Section 12, for further information). For dry spills, sweep, vacuum, or shovel and place in containers for disposal in accordance with applicable regulations (refer to Sections 13 and 15 for additional references and information regarding California and EPA regulations). Avoid contamination of bodies of water during cleanup. Boric Acid will cause localized contamination of surrounding waters depending on amount dissolved

in these waters. Some damage to local vegetation, fish, and other aquatic life may be expected (see Section 12). Under usual conditions, no protective equipment is required.

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). (See Section 15)

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**HANDLING & STORAGE**

**GENERAL:** Dry, indoor storage under normal atmospheric conditions 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 should be maintained to minimize dust accumulation and generation. Boric Acid may cake in moist conditions.  
**HYGIENIC PRACTICES:** Wash hands thoroughly with soap and water after handling, and before eating, drinking, or smoking.

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**EXPOSURE CONTROLS/PERSONAL PROTECTION**

**ENGINEERING CONTROLS:** Use local exhaust ventilation to keep airborne levels below exposure limits (see Section 15).  
**EYE PROTECTION:** Use goggles or vented safety glasses in excessively dusty conditions.

**SKIN PROTECTION:** Not required under normal conditions. Use if excessively dusty or if skin is damaged.  
**RESPIRATORY PROTECTION:** Use appropriate NIOSH/MSHA certified respirators when levels are expected to exceed exposure limits (see Section 15).

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**PHYSICAL & CHEMICAL PROPERTIES**

**SOLUBILITY IN WATER:** 4.7% at 20°C; 27.5% at 100°C  
**APPEARANCE:** White granular or powder solid, odorless.  
**MOLECULAR WEIGHT:** 61.83  
**BOILING POINT:** Not Applicable  
**MELTING POINT:** 169°C

**pH VALUE:** 5.1 (in a 1% solution at 20°C)  
**FLASH POINT:** None  
**SPECIFIC GRAVITY (H<sub>2</sub>O = 1 at 4°C):** 1.44  
**VAPOR PRESSURE:** Not Applicable  
**BULK DENSITY:** 57 lbs./ft.<sup>3</sup>

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**STABILITY & REACTIVITY DATA**

**STABILITY:** Stable under normal conditions; forms partial hydrate in moist air. When heated, water is lost forming Metaboric Acid (HBO<sub>2</sub>). On further heating, the material is converted to boric oxide (B<sub>2</sub>O<sub>3</sub>).  
**INCOMPATIBILITY:** 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 PRODUCTS:** None known.  
**HAZARDOUS POLYMERIZATION:** Will not occur.

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**TOXICOLOGICAL EFFECTS**

**EYES:** Boric Acid, when applied to the eyes of albino rabbits (Draize test), produced effects of mild erythema, and mild to moderate discharge in 5 of 6 rabbits. All signs subsided by the fourth day after application. Fifty years of occupational exposure history indicates no human eye injury from exposure to Boric Acid.

**SKIN:** Boric Acid was applied to the skin of albino rabbits. Slight to no irritation persisted 72 hours after application. No evidence of tissue damage was found. Low acute dermal toxicity; LD<sub>50</sub> for rabbits is expected to be greater than 2,000 mg/kg of body weight (test conducted per 16 CFR 1500.41). Boric Acid is not absorbed through intact skin.

**INHALATION:** Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposure to Boric Acid and Sodium Borate dust.

**INGESTION:** Low acute oral toxicity; LD<sub>50</sub> for Sprague-Dawley rats is 3,500 to 4,100 mg/kg of body weight.

**CARCINOGENICITY:** Boric Acid is not listed as a carcinogen by the Environmental Protection Agency (EPA), the State of California, or the International Agency for Research on Cancer (IARC). A report issued by the National Toxicology Program showed "no evidence of carcinogenicity" from a full two-year bioassay on Boric Acid on mice at feed doses of 2,500 to 5,000 ppm in the diet. No mutagenic activity was observed for Boric Acid in a recent battery of four short-term mutagenicity assays.

**REPRODUCTIVE:** A human study of occupationally exposed Borate worker population showed no adverse reproductive effects. Animal studies indicate that Boric Acid reduces or inhibits sperm production, causes testicular atrophy, and, when given to pregnant animals during gestation, may cause

developmental changes. These feed studies were conducted under chronic exposure conditions leading to doses many times in excess of those that could occur through inhalation of dust in the occupational setting.

Dietary levels of Boric Acid of 6,700 ppm in chronic feeding studies in rats and dogs produced testicular changes (Weir, Fisher, 1972). In chronic feeding studies of mice on diets containing 5,000 ppm Boric Acid, testicular atrophy was present, while mice fed 2,500 ppm Boric Acid showed no significant increase in testicular atrophy. In another chronic Boric Acid study, degeneration of seminiferous tubules was present together with a reduction of germ cells in mice fed 4,500 ppm Boric Acid. In a reproduction study on rats, 2,000 ppm of dietary Boric Acid had no adverse effect on lactation, litter size, weight and appearance [Weir, Fisher, 1972].

In a continuous breeding study in mice, there was a reduction in fertility rates in males receiving 4,500 ppm Boric Acid, but not for females receiving 4,500 ppm Boric Acid [Fail et al., 1992].

Boric Acid at dietary levels of 1,000 ppm administered to pregnant female rats throughout gestation caused a slight reduction in fetal weight, but was considered close to NOAEL. Doses of 2,000 ppm and above caused fetal malformations and maternal toxicity. In mice, the no effect level for fetal

weight reduction and maternal toxicity was 1,000 ppm Boric Acid. Fetal weight loss was noted at dietary levels of 2,000 ppm and above. Malformations (agenesis or shortening of the thirteenth rib) were seen at 4,000 ppm [Heindal et al., 1992].

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## ECOLOGICAL DATA

**NOTE:** Boron is the element in Boric Acid which is used to characterize Borate product ecological effects. To convert Boric Acid to boron multiply by 0.1748.

**FISH TOXICITY:** Boron naturally occurs in seawater at an average concentration of 5 mg B/liter. In laboratory studies the acute toxicity (95-hr LC<sub>50</sub>) for under-yearling Coho salmon (*Onchorhynchus kisutch*) in seawater was determined as 40 mg B/L (added as Sodium Metaborate). The Minimum Lethal Dose for minnows exposed to Boric Acid at 20° C for 6 hours is 18,000 to 19,000 mg/l in distilled water, 19,000 to 19,500 in hard water.

Rainbow trout (*S. gairdneri*)  
24-day LC<sub>50</sub> = 150.0 mg/B/L  
36-day NOEC-LOEC = 0.75-1 mg/B/L  
Goldfish (*Carassius auratus*)  
7-day NOEC-LOEC = 26.50 mg/B/L  
3-day LC<sub>50</sub> = 178 mg/B/L

**BIRD TOXICITY:** Dietary levels of 100 mg/kg resulted in reduced growth of female mallards. As little as 30 mg/kg fed to mallard adults adversely affected the growth rate of offspring.

### INVERTEBRATE TOXICITY:

Daphnids  
48-hour LC<sub>50</sub> = 133 mg/B/L  
21-day NOEC-LOEC = 6-13 mg/B/L

**PHYTOTOXICITY:** Although boron is an essential micro-nutrient for healthy growth of plants, it can be harmful to boron-sensitive plants in higher quantities. Plants and trees can easily be exposed by root absorption to toxic levels of boron in the form of water-soluble Borate leached into nearby waters or soil. Care should be taken to minimize the amount of boron released to the environment.

### ENVIRONMENTAL FATE DATA:

**Persistence/Degradation:** Boron is naturally occurring and is commonly found in the environment. Boric Acid decomposes in the environment to natural Borate.

**Soil Mobility:** The product is soluble in water and is leachable through normal soil.

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## DISPOSAL CONSIDERATIONS

**DISPOSAL GUIDANCE:** Small amounts of Boric Acid can usually be disposed of at municipal landfill sites, and requires no special treatment. Tonnage quantities are not however, recommended for the landfill, and if possible, should be re-used for an appropriate application. Refer to state and local regulations for applicable site-specific requirements. Boric Acid is not currently listed under any sections of the U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA).

**CALIFORNIA HAZARDOUS WASTE DESIGNATION:** California identifies substances with acute LD<sub>50</sub>'s of less than 2,500 mg/kg as "hazardous wastes". Boric Acid is, therefore, not a "hazardous waste" if spilled in California.

See Section 15 for details on Regulatory Information.

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## TRANSPORT REGULATIONS

**US DEPARTMENT of TRANSPORTATION (DOT) IDENTIFICATION NUMBER:** Boric Acid is not a DOT Hazardous Material or Hazardous Substance.

**INTERNATIONAL TRANSPORTATION:** Boric Acid has no U.N. number, and is not regulated under international rail, highway, water, or air transport regulations.

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## REGULATORY INFORMATION

**TSCA NUMBER:** 10043-35-3

**RCRA (40 CFR 261):** Not listed under any section.

**CERCLA (SUPERFUND):** Not listed under any section.

**CLEAN WATER ACT (CWA):** Boric Acid is not regulated by any water quality criteria under Section 304, is not listed as priority pollutant under Section 307, and is not listed as a hazardous substance under Section 311.

**SAFE DRINKING WATER ACT (SDWA):** Not regulated under SDWA, 42 USC 300g-1, 40 CFR 141 et seq. Consult state and local regulations for possible water quality advisories involving boron.

**OCCUPATIONAL EXPOSURE LIMITS:** Boric Acid is listed/regulated by OSHA, CAL OSHA, or ACGIH as "Particulate Not Otherwise Classified" or "Nuisance Dust".

**OSHA:** Permissible Exposure Limit: 15 mg/m<sup>3</sup>, total dust  
5 mg/m<sup>3</sup>, respirable dust

**ACGIH:** Threshold Limit Value: 10 mg/m<sup>3</sup>

**CALIFORNIA OSHA:** Permissible Exposure Limit: 10 mg/m<sup>3</sup>

**INTERNATIONAL AGENCY for RESEARCH on CANCER:** Not listed as a carcinogen.

**NTP ANNUAL REPORT ON CARCINOGENS:** Not listed as a carcinogen.

**OSHA CARCINOGEN:** Not listed as an OSHA carcinogen.

**CONEG MODEL LEGISLATION:** Meets all CONEG requirements relating to heavy metal limitations on components of packaging materials.

**CALIFORNIA PROPOSITION 65:** Not listed as carcinogen or reproductive toxin.

**FEDERAL DRUG AGENCY (FDA):** 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.

**WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEMS (WHMIS):** With the exception of the 16 section format, this MSDS conforms to current WHMIS standards.

**SARA III Section 302, 303, 311, 312, 313:** Not listed.

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## OTHER INFORMATION

## OTHER INFORMATION:

## Product Label Text Hazard Information:

- May be harmful if swallowed.
- May cause reproductive harm or birth defects based on animal data.
- Avoid contamination of food or feed.
- Not for food, drug or pesticidal use (may be used as a pesticide when properly registered for such use).
- Practice good housekeeping.
- Refer to MSDS.
- KEEP OUT OF THE REACH OF CHILDREN.

## National Fire Protection Association (NFPA) Classification:

4 = Severe, 3 = Serious, 2 = Moderate, 1 = Slight, 0 = Minimal

Health	0
Flammability	0
Reactivity	0

## Hazardous Materials Information Systems (HMIS):

4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Insignificant

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

\* Chronic Effects (for explanation see Section 11)

## NOTICE

Judgements as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, IMC Chemicals extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

## REFERENCES

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