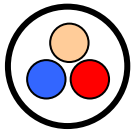


**ETİ MINE WORKS GENERAL MANAGEMENT
TECHNOLOGY & DEVELOPMENT DEPARTMENT**

BORIC ACID HEALTH AND SAFETY DATA SHEET

Date of Issue : March 2007
Revision No : 4
Date of Revision : September 2011

**ETİ MINE WORKS GENERAL MANAGEMENT
TECHNOLOGY DEVELOPMENT DEPARTMENT**
Bahçekapı Mah. Fatih Sultan Mehmet Bulvarı No:179 Postcode:06377
Etimesgut / ANKARA, TÜRKİYE



SECTION 1. Identification

1.1. GHS Product Identifier

Boric Acid

1.2. Other means of identification

Chemical name/synonyms: Boric acid, Orthoboric acid, boracic acid

1.3. Recommended use of the chemical and restrictions on use

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

- Ceramics
- Cosmetics
- Detergent
- Borosilicate glass
- Textile fibreglass

There is no restriction on use of chemical.

1.4. Supplier's details

Name : GENERAL DIRECTORATE OF ETİ MADEN İŞLETMELERİ

Address : Korkutreis Mah., Cihan Sok. No:2, Sıhhiye Çankaya 06430, Ankara, Türkiye.

Phone No : + 90 312 294 23 42

Phone No : + 90 312 294 23 42

Fax No : + 90 312 232 59 10

1.5. Emergency phone number : + 90 312 294 23 42 (Available office hours)

Fax number : + 90 312 232 59 10 (Available office hours)

SECTION 2. Hazard Identification

2.1. Classification of the substance according to GHS

Reproductive toxicant, Category 2

H 361d : Suspected of damaging the unborn child

Acute Oral 5

H303: May be harmful if swallowed.

2.2. GHS Label elements, including precautionary statements



H361d : Suspected of damaging the unborn child

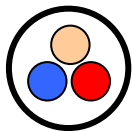
H303: May be harmful if swallowed

Warning

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.

P312: Call a POISON CENTER/doctor/physician if you feel unwell

P405 : Store locked up.

2.3. Other hazards which do not result in classification

Boric acid is a white odourless, 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 boric acid is poorly absorbed through intact skin.

Inhalation

Occasional mild irritation effects to nose and throat may occur from inhalation of boric acid dusts at levels greater than 10 mg/m³.

Eye contact

Boric acid is non-irritating to 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.

Potential ecological effects

Large amounts of 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 Boric Acid have been associated with ingestion or absorption through large areas of damaged skin. These may include nausea, vomiting and diarrhoea, with delayed effects of skin redness and peeling.

Refer to section 11 for details on Toxicological data.

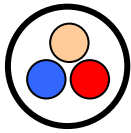
SECTION 3. Composition / Information on Ingredients

3.1. Substances

The product contains greater than 99.9 percent (%) boric acid (H₃BO₃).

Chemical Name	EC No/CAS No	Purity	Hazard Statement (GHS)
Boric acid	233-139-2 10043-35-3	99,9 %	H 361d H303

For other "Chemical inventory listing", please refer to section 15.



SECTION 4. First aid measures

Skin contact

No treatment necessary because non-irritating.

Eye contact

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

Inhalation

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

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.

Note to physicians

Observation only is required for adult ingestion of less than 6 grams of boric acid. For ingestion in excess of 6 grams, maintain adequate kidney function and force fluids. Gastric lavage is recommended for symptomatic patients only. Haemodialysis 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).

SECTION 5. Fire-fighting measures

Boric acid is not flammable, combustible or explosive. The product is itself a flame retardant.

5.1. Suitable Extinguishing media

Any fire extinguishing media may be used on nearby fires.

5.2 Specific hazards arising from the chemical

No data available

5.3. Special protective actions for fire-fighters

N.A.

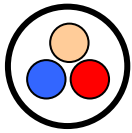
SECTION 6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Avoid dust formation. 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

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).



6.3. Methods and materials for containment and cleaning up

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 clean up and disposal. No personal protective equipment is needed to clean up 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 (see sections 12, 13 and 15).

SECTION 7. Handling and Storage

7.1. Precautions for safe Handling

To maintain package integrity and to minimise 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 minimise dust generation and accumulation. Your supplier can advise you on safe handling, please contact the supplier.

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, including any incompatibilities

No special handling precautions are required, but dry, indoor storage is recommended. No specific requirements. Provide appropriate ventilation and store bags such as to prevent any accidental damage.

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"*

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

8.2. Appropriate engineering controls

Maintain air concentrations below occupational exposure standards.

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

8.3. Individual protection measures, such as personal protective equipment

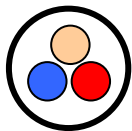
- *Respiratory protection*

In case of prolonged exposure to dust wear a personal respirator in compliance with national legislation (make reference to the appropriate CEN standart)

Where airborne concentrations are expected to exceed exposure limits, respirators should be used.

- *Eyes and hands protection*

Goggles and gloves are not required for normal industrial exposures, but may be warranted if environment



is excessively dusty.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	crystalline solid, white
Odour	odourless
Odour threshold	N.A.
pH @ 20°C	6.1 (0.1 % solution) 5.1 (1.0% solution) 3.7 (4.7 % solution)
Melting point/freezing point	169±1°C (heated in closed space)
Initial boiling point and boiling range	300. °C (dehydration temperature)
Flash point	Non flammable
Evaporation rate	N.A.
Flammability (solid, gas)	N.A.
Upper/lower flammability or explosive limits	Non explosive
Vapour pressure	Negligible @ 20°C
Relative density	1,49 gr/cm ³ @ 23 °C
Solubility in water	4.7% @ 20°C; 27.5% @ 100°C
Partition coefficient :n-octanol/water	Log Kow (Pow): -1.09 at 22 °C
Auto-Ignition temperature	N.A.
Decomposition temperature	N.A.
Viscosity	N.A.

9.2. Other information

Molecular weight	61.83
Bulk density	780-815 kg/m ³
Specific gravity	1.51 gr/cm ³

SECTION 10. Stability and reactivity

10.1. Reactivity

N.A.

10.2. Chemical stability

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).

10.3. Possibility of hazardous reactions

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

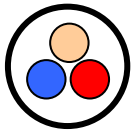
10.4. Conditions to avoid:

N.A.

10.5. Incompatible materials

Boric acid reacts as a weak acid which may cause corrosion of base metals.

10.6. Hazardous decomposition products



N.A.

SECTION 11. Toxicological information

Acute toxicity

Low acute oral toxicity; LD₅₀ in rats is 3,500 to 4,100 mg/kg of body weight⁽²⁾.

Skin corrosion / irritation

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⁽²⁾. Non-irritant.

Serious eye damage/ irritation

Non-irritant. Boric acid indicate no adverse effects on human eye.

Respiratory or skin sensitization

Boric acid is not a skin sensitizer.

Germcell mutagenicity

N.A.

Carcinogenicity

N.A.

Reproductive/Developmental toxicity

Animal feeding studies in rat, mouse and dog, at high doses, have demonstrated effects on fertility and testes^[2]. Studies with the chemically related boric acid in rat, mouse and rabbit, at high doses, demonstrate developmental effects on the foetus including foetal 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 sodium borate dust. A recent epidemiology study under the conditions of normal occupational exposure to borate dusts indicated no effect on fertility^(6,7,8).

STOT-single exposure

No data available

STOT-repeated exposure;and

No data available

Aspiration Hazard

Low acute inhalation toxicity; LC₅₀ in rats is greater than 2.0 mg/l (or g/m³)⁽²⁾.

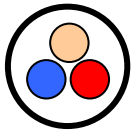
SECTION 12. Ecological information

12.1. Toxicity

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 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 higher quantities. Care should be taken to minimise the amount of borate product released to the environment.



Algal toxicity⁽⁹⁾

Green algae, *Pseudokirchneriella subcapitata* (Hansveit and Oldersma, 2000)

72-hr EC₅₀ –biomass = 40 mg B/L, or 229 mg boric acid/L.

Invertebrate toxicity⁽¹⁰⁾

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⁽¹¹⁾

Fish, Fatheted 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. Boric acid decomposes in the environment to natural borate.

12.3. Bioaccumulative potential

Not significantly bioaccumulative.

12.4. Mobility in soil

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

12.5. Other adverse effects

No Data Available.

SECTION 13. Disposal considerations

13.1. Disposal methods

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 are not recommended to be sent to landfills. Such product should, if possible, be used for an appropriate application.

SECTION 14. Transport information

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

14.1. UN number: N.A.

14.2. UN proper shipping name: N.A

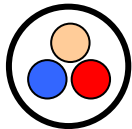
14.3. Transport of hazard classes: N.A

14.4. Packing group: N.A

14.5. Environmental hazards: N.A.

14.6. Special precautions for user: N.A

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



SECTION 15. Regulatory information

15.1. Safety, health and environmental regulations

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. CLP classification has been solely based on animal tests where animals were exposed to high doses of boric acid over long periods of time. These doses were many times higher than humans are exposed to under conditions of normal handling and use. Consequently, a precautionary decision was taken by the European Commission. Although we will comply with the body of legislation triggered by that decision, we are in process of all possible legal actions.

Clean Air Act (Montreal Protocol)

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

Chemical inventory listing

- | | |
|---------------------------|------------|
| - 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 |

Ensure all national/local regulations are observed.

SECTION 16. Other information

16.1. Mainly changes made to the previous version of this Material Safety Data Sheet (MSDS):

- This MSDS complies with ISO 11014; the requirements of un GHS
- The main additions are related to the classification and labeling of our product according to UN GHS.

16.2. List of abbreviation and acronyms used in this MSDS

MSDS : Material Safety Data Sheet

Index N°: atomic number of the element most characteristic of the properties of the substance

CAS No: Chemical Abstracts Service number

EC No : EINECS Number : European Inventory of Existing Commercial Substances

Repr. Cat. 2: substance presumed human reproductive toxicant

Eye irrit. Cat. 2A: substance inducing potential reversible eye irritation

Acute Oral Cat. 5: substance which is of relatively low acute oral toxicity.

GHS: Globally Harmonised System of Classification and Labelling

1st ATP : 1st Adaptation to Technical and scientific Progress

LD₅₀: Median Lethal Dose

LC₅₀: Lethal Concentration, 50%

N.A. Not Applicable

OSHA: Occupational Safety & Health Administration

Cal OSHA: The State of California Division of Occupational Safety and Health (DOSH)

PEL: Permissible Exposure Limits

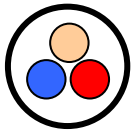
ACGIH: American Conference of Governmental Industrial Hygienists

TLV: Threshold Limit Value

Japanese MITI: Japanese Ministry of International Trade and Industry

EC₅₀: Half maximal effective concentration

UN: United Nations



U.S. EPA TSCA Inventory: Inventory of the chemical substances manufactured or processed in the United States according to Toxic Substances Control Act compiled and published under the authority of the Environmental Protection Agency

Canadian DSL: Canadian Domestic Substances List

16.3. List of relevant hazard statements and precautionary statements used in this MSDS

Hazard Statement
H361 d: Suspected of damaging the unborn child
H303: May be harmful if swallowed
Precautionary Statements
<u>Prevention</u> 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.
<u>Response</u> P308 + P313: If exposed or concerned: get medical advice/attention. P312: Call a POISON CENTER/doctor/physician if you feel unwell
<u>Storage</u> P405: Store locked up.
<u>Disposal:</u> P501: Dispose of contents/container to in accordance with local regulations.

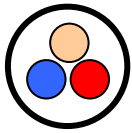
16.4. References

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. Birge W J, Black J A, EPA-560/-76-008 (April 1977) PB 267 085
7. Scialli AR, Bonde JP, Brüske-Hohlfeld I, Culver D, Li Y, Sullivan FM; ELSEVIER 2009
8. Robbins WA, Xun L, Jia J, Kennedy N, Elashoff DA, Ping L. ;ELSEVIER 2009;(Reproductive Toxicology)
9. Hansveit and Oldersma, 2000; TNO Nutrition and Food Research Institute. Report No. V99.157.
10. Gersich, FM (1984a). Environ.Toxicol.Chem., 3 #1, 89-94 (1984)
11. Soucek *et al.*, 2010. Illinois Natural History Survey, University of Illinois.

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'.

16.5. Disclaimer of Liability

The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its accuracy, reliability or



completeness. The conditions or methods of handling, storage use or disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use.

This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS information may not be applicable.