ETİ-ZnBor
SAFETY DATA SHEET

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ETİ MADEN İŞLETMELERİ GENEL MÜDÜRLÜĞÜ
Ayvalı Mah. Halil Sezai Erkut Cad. Afra Sok. No: 1/A 06010 Keçiören/Ankara TÜRKİYE

SECTION 1. Identification of the Substance and the Company

1.1. Product identifier

Substance name : Dodecaboron tetrazinc docosaoxide heptahydrate

Trade names **:** ETİ-ZnBor (Zinc borate)

Chemical name/synonyms: Zinc borate hydrate, hexaboron dizinc undecaoxide, dodecaboron tetrazinc docosaoxide heptahydrate.

Index No **: -**

CAS No **:** 138265-88-0*

EC No **:** 235-804-2

* This substance is registered under Hexaboron dizinc undecaoxide (CAS#: 12767-90-7 / EC#: 235-804-2) registration dossier as hydrated form, in line with REACH Regulation of European Union.

REACH Registration Number : 01-2119691658-19-0007

1.2. Relevant identified uses of the substance and uses advised against

Relevant identified uses

The product is used in industrial manufacturing and formulation, among others in:

- Flame retardant

For area-specific use, see the exposure scenarios in the annex of this extended Safety Data Sheet (eSDS).

Uses advised against

Not applicable, there are no uses of Zinc Borate advised against.

1.3. Details of the supplier of the safety data sheet

Importer

Name **:** AB ETIPRODUCTS OY

Address **:** Piispanportti 5, 02240 Espoo/FINLAND

Phone No **:** + 358 9 819 444 40

Fax No **:** + 358 9 819 444 44

e-mail **:** sales@etiproducts.com

Manufacturer

Name **:** ETİ MADEN İŞLETMELERİ GENEL MÜDÜRLÜĞÜ

Address **:** Ayvalı Mah. Halil Sezai Erkut Cad. Afra Sok. No:1/A 06010 Keçiören/Ankara TÜRKİYE

Phone No **:** +90 312 294 20 00

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1.4. Emergency phone number: +49 (0)6132-84463 [24-Hour-Number] GBK GmbH

SECTION 2. Hazard Identification

2.1. Classification of the substance

2.1.1. Self-classification according to CLP (1272/2008) Regulation of EU

Reproductive toxicant, Category 2	H361: Suspected of damaging fertility or the unborn child
Aquatic Acute 1	H400: Very toxic to aquatic life
Aquatic Chronic 2	H411: Toxic to aquatic life with long lasting effects

Precautionary Statement Prevention	: P201, P202, P273, P280
Precautionary Statement Response	: P308+P313, P391
Precautionary Statement Storage	: P405
Precautionary Statement Disposal	: P501

2.1.2. Additional information

For the full text of Hazard Class/Statements and Precautionary Statements see SECTION 16.3.

2.2. Label elements

2.2.1. Label according to Regulation (EC) N°1272/2008 (CLP)

Hazard pictograms:

Signal word : Warning

Hazard Statements : H361 : Suspected of damaging fertility or the unborn child
H400 : Very toxic to aquatic life
H411 : Toxic to aquatic life with long lasting effects

Precautionary Statements:

P202	: Do not handle until all safety precautions have been read and understood.
P273	: Avoid release to the environment.
P280	: Wear protective gloves/protective clothing/eye protection/face protection.
P308 + P313	: If exposed or concerned: get medical advice/attention.
P391	: Collect spillage.
P405	: Store locked up.

2.3. Other hazards

Emergency overview

ETİ-ZnBor is a white odourless, powder 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 ETİ-ZnBor is poorly absorbed through intact skin.

Inhalation

Occasional mild irritation effects to nose and throat may occur from inhalation of ETİ-ZnBor dusts.

Eye contact

ETİ-ZnBor is non-irritating to eyes in normal industrial use.

Skin contact

ETİ-ZnBor does not cause irritation to intact skin.

Ingestion

Products containing ETİ-ZnBor are not intended for ingestion. ETİ-ZnBor has 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 [1]. A human study of occupational exposure to borate dusts showed no adverse effect on reproduction. An 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 [2]. A study conducted in Turkey with boron exposed mine workers showed that mean blood concentrations of the high exposure group is ~6 times and ~9 times lower than those of the highest no effect level of boron in blood with regard to developmental and reprotoxic effects (respectively) in rats. With those findings, no unfavourable effects of boron exposure on reproductive indicators are observed in humans [3, 4]. Hexaboron dizinc undecaoxide has low toxicity (acute oral LD50 is > 10,000 mg/kg) compared to other borates indicating that the bioavailability of boron from hexaboron dizinc undecaoxide may be low [5].

Potential ecological effects

Large amounts of ETİ-ZnBor are harmful to plants and other species. Accidental releases to the environment should be minimized.

Signs and symptoms of exposure

Symptoms of accidental over-exposure to borate salts have been associated with ingestion or absorption through large areas of damaged skin. These may include nausea, vomiting, and diarrheal, with delayed effects of skin redness and peeling (see SECTION 11).

SECTION 3. Composition / Information on Ingredients

3.1. Substance

The product contains greater than 98.0 percent (%) ETİ-ZnBor ($2ZnO\ 3B_2O_3\ 3.5H_2O$).

Identification Name	EC N°	CAS N°	Registration number	Wt. %
Zinc Borate, dodecaboron tetrazinc docosaoxide heptahydrate	235-804-2	138265-88-0	01-2119691658-19-0007	> 98.0

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

SECTION 4. First aid measures

4.1. Description of first aid measures

Skin contact

No treatment necessary because ETİ-ZnBor does not cause irritation to intact skin.

Eye contact

No treatment necessary because non-irritant.

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), contact a doctor or toxicity centre immediately.

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

N.A.

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

Observation only is required for adult ingestion of less than 4 grams of ETİ-ZnBor. For ingestion in excess of 4 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 [6] (see SECTION 11).

SECTION 5. Firefighting measures

5.1. Extinguishing media

Any appropriate fire extinguishing media may be used on nearby fires.

5.2. Special hazards arising from the substance

ETİ-ZnBor is not flammable, combustible or explosive. The product is itself a flame retardant.

5.3. Advice for firefighters

N.A.

SECTION 6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

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

6.2. Environmental precautions

ETİ-ZnBor is slightly water-soluble (0.28%) white product that may, at high concentrations cause damage to trees or vegetation by root absorption (see SECTION 12).

6.3. Methods and material for containment and cleaning up

Land spill

Vacuum, shovel or sweep up ETİ-ZnBor 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).

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 procedures should be followed to minimize dust generation and accumulation. Your supplier can advise you on safe handling, please contact the supplier.

7.2. Conditions for safe storage, including any incompatibilities

No special handling precautions are required, but dry, indoor storage is recommended. Provide appropriate ventilation and store bags such as to prevent any accidental damage. The product should be kept away from strong reducing agents.

7.3. Specific end use(s)

See exposure scenario in Annex to the SDS.

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. Exposure controls

8.2.1. Appropriate engineering controls

Maintain air concentrations below occupational exposure standards.

Use local exhaust ventilation to keep airborne concentrations of ETİ-ZnBor 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

Individual protection measures should be preferred taking into account the Council Directive 89/966/EEC and the appropriate CEN standard.

Respiratory protection

In case of prolonged exposure to dust wear a personal respirator in compliance with national/international legislation (CEN standard).

Eyes and hands protection

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

8.2.3. Environmental exposure controls

Use local exhaust ventilation to keep airborne concentrations of ETİ-ZnBor dust below permissible exposure levels. Remove and wash soiled clothing.

In order to prevent environment release, spillages of ETİ-ZnBor should be swept or vacuumed up and placed in containers for disposal.

Wastes of ETİ-ZnBor should be treated as a hazardous waste and removed by authorized operator to a hazardous landfill site. Avoid spillage into water.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	: Solid, white
Odour	: Odourless
Odour threshold	: N.A.
pH @ 25°C	: 6.5-7.5 (1% solution)
Melting point	: 650°C
Initial boiling point and boiling range	: No data available
Flash point	: Non flammable
Evaporation rate	: N.A.
Flammability (solid, gas)	: N.A.
Upper/lower flammability or explosive limits	: N.A.
Vapour pressure	: Negligible @ 20°C

Vapour density	: N.A.
Specific gravity	: 2.77 @ 20°C
Solubility in water	: < 0.28 % @ 25°C
Partition coefficient: n-octanol/water	: N.A.
Auto-ignition temperature	: N.A.
Decomposition temperature	: No data available
Viscosity	: N.A.
Explosive properties	: Non explosive
Oxidising properties	: N.A.

9.2. Other information

Molecular weight	: 434.6
Bulk density	: ≥ 0.45 g/cm^3

SECTION 10. Stability and reactivity

10.1. Reactivity

ETİ-ZnBor is a stable product.

10.2. Chemical stability

ETİ-ZnBor is a stable product, but when heated it loses water eventually forming anhydrous product.

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

Avoid contact with strong reducing agents.

10.5. Incompatible materials

Avoid contact with strong reducing agents such as metal hydrides, acetic anhydride or alkali metals.

10.6. Hazardous decomposition products

N.A.

SECTION 11. Toxicological information

11.1. Information on toxicological effect

11.1.1. Substances

Acute toxicity

Low acute oral toxicity; LD_{50} in rats (male) is >10,000 mg/kg of body weight (Test material is hexaboron dizinc undecaoxide) [5].

Skin corrosion/ irritation

Dodecaboron tetrazinc docosaoxide heptahydrate has no skin corrosion/irritation.

Serious eye damage/ irritation

Dodecaboron tetrazinc docosaoxide heptahydrate has no eye damage/irritation.

Skin sensitization

Dodecaboron tetrazinc docosaoxide heptahydrate is not a skin sensitizer.

Germcell mutagenicity

Dodecaboron tetrazinc docosaoxide heptahydrate is not mutagenic.

Carcinogenicity

No data available.

Reproductive toxicity

Animal feeding studies in rat, mouse and dog, at high doses, have demonstrated effects on fertility and testes [1]. Studies 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 [7, 8]. Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid dust. A recent epidemiology study under the conditions of normal occupational exposure to borate dusts indicated no effect on fertility [2]. A study conducted in Turkey with boron exposed mine workers showed that mean blood concentrations of the high exposure group is ~6 times and ~9 times lower than those of the highest no effect level of boron in blood with regard to developmental and reprotoxic effects (respectively) in rats. With those findings, no unfavorable effects of boron exposure on reproductive indicators are observed in humans [3, 4]. Hexaboron dizinc undecaoxide has low toxicity (acute oral LD50 is > 10,000 mg/kg) compared to other borates indicating that the bioavailability of boron from hexaboron dizinc undecaoxide may be low [5].

STOT-single exposure

N.A.

STOT-repeated exposure

N.A.

Aspiration hazard

Dodecaboron tetrazinc docosaoxide heptahydrate has no aspiration hazard.

SECTION 12. Ecological information

12.1. Toxicity

No toxicity data values are available. Below given values are expressed as zinc ion or boron equivalents. To convert to this product, divide the zinc equivalent by 0.301 and divide the boron equivalent by 0.149. Studies judged to be unreliable or with insufficient information to evaluate are not included. All toxicity values are reported as added concentrations, i.e. with subtraction of the background concentration of zinc or boron in the test media.

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.

Zinc is a required element for plants, animals as well as humans in low concentrations.

Algal toxicity

Green algae, *Pseudokirchneriella subcapitata*

72-hr EC_{50} –biomass = 40 mg B/L [9]

Algal, Pseudokirchneriella subcapitata NOEC (3d) = 0.024 mg Zn/L (Chronic studies) [10]

Algal, Pseudokirchneriella subcapitata IC50 (72h) = 0.136 mg Zn/L (Acute studies) [10]

Invertebrate toxicity

Daphnia, Daphnids, *Daphnia magna*

48-hr LC_{50} = 133 mg B/L [11]

Daphnia,Daphnids,Daphnia magna NOEC (50d) = range between 0.031-0.208 mg/L(Chronic studies) [12]

Daphnia, Daphnids, Daphnia magna 48-hr LC_{50} = 1.22 mg Zn/L (Acute studies) [13]

Fish toxicity

Fish, Fathered minnow, *Pimephales promelas*

96-hr LC_{50} = 79.7 mg B/L [14]

Fish, NOEC (72d): 0.044 mg Zn/L (Joranella floridae) (Chronic studies) [15]

Fish, 96-hr LC_{50} = 0.169 mg Zn/L (Oncorhynchus mykiss) (Acute studies) [16]

12.2. Persistence and degradability

Not applicable. Dodecaboron tetrazinc docosaoxide heptahydrate is an inorganic substance.

12.3. Bioaccumulative potential

Not bioaccumulative.

12.4. Mobility in soil

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

12.5. Results of PBT and vPvB assessment

N.A.

12.6. Other adverse effects

No data available.

SECTION 13. Disposal considerations

13.1. Waste treatment methods

ETİ-ZnBor is classified as toxic to reproduction (Repr. 2) and as dangerous for the environment (Env. Acute 1) and falls within scope of Directive 2008/98/EC as hazardous waste. Local authorities should be consulted about any specific local requirements. Tonnage quantities of product should be sent to hazardous landfill sites.

SECTION 14. Transport information

Dodecaboron tetrazinc docosaoxide heptahydrate has a UN Number, and is regulated under international rail, road, water or air transport regulations.

14.1. UN number **:** 3077

14.2. UN proper shipping name **:** Environmentally Hazardous Substance. Solid, N.O.S. (Zinc Borate)

14.3. Transport hazard class(es) **:** 9

14.4. Packing group **:** III

14.5. Environmental hazards **:** Marine pollutant

14.6. Special precautions for user **:** N.A.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: N.A.

SECTION 15. Regulatory information

15.1. Safety, health and environmental regulations

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

Chemical Inventory Listing: Dodecaboron tetrazinc docosaoxide heptahydrate (CAS: 138265-88-0) appears on several chemical inventory lists including the EPA TSCA inventory, Canadian DSL, European EINECS, Japanese ENCS, South Korea KECI, China IESCS, New Zealand NZIoC, Philippines PICCS, and Australia AICS inventories.

- U.S. EPA TSCA : 12767-90-7
- Canadian DSL : 12767-90-7
- EINECS : 235-804-2
- South Korea KECI : KE-18394
- Japan ENCS : MITI 1-73
- China IESCS : 138265-88-0/12767-90-7
- New Zealand NZIoC : 138265-88-0/12767-90-7

- Philippines PICCS : 12767-90-7
- Australia AICS : 138265-88-0/12767-90-7

Ensure all national/local regulations are observed.

German Water Hazard Class (WGK): Substances and mixtures can pose a hazard to water bodies. To protect the water bodies from detrimental changes to their characteristics it is required that substances and mixtures that are handled or stored in facilities in Germany are classified for their water hazard properties.

Classification is carried out on the basis of the Ordinance on facilities for handling substances that are hazardous to water (Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (AwSV)) of 18 April 2017 (BGBI 2017, Teil I, Nr. 22, Seite 905).

There are three water hazard classes (WGK).

1: slightly hazardous to water

2: obviously hazardous to water

3: highly hazardous to water

Dodecaboron tetrazinc docosaoxide heptahydrate: N.A

15.2. Chemical safety assessment

Chemical Safety Assessment of dodecaboron tetrazinc docosaoxide heptahydrate has been carried out under REACH Regulation of the EU.

SECTION 16. Other information

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

This SDS complies with ISO 11014; the requirements of REACH Title IV and was compiled in compliance with Annex II of REACH duly amended by **Commission Regulation (EU) No 2015/830 of 28 May 2015** (EU No 453/2010) for the first time.

Revision No	Revision date	Revision content
00	May 2017	This SDS has been compiled in accordance with Annex II of REACH duly amended by Commission Regulation (EU) No 2015/830 of 28 May 2015 (EU No 453/2010) for the first time.
00.1	January 2018	This SDS was updated in line with "Standardization and Simplification of Bag Printings" and REACH zinc borate registration dossier.
00.2	September 2018	The CAS number of ETİ-ZnBor was updated to represent the hydrated composition of the product.
00.3	February 2019	• This SDS was updated to include German Water Hazard Class (WGK) info under Section 15.

16.2. List of abbreviation and acronyms used in this SDS

ACGIH : American Conference of Governmental Industrial Hygienists

AICS : Australian Inventory of Chemical Substances

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

Canadian DSL : Canadian Domestic Substances List

CAS N° : Chemical Abstracts Service number

Chemicals in Bulk (International Bulk Chemical Code)

CLP : Classification Labelling Packaging Regulation: Regulation (EC) N°1272/2008

CSR : Chemical Safety Report

DNEL : Derived No effect Level

EC N° : EINECS Number: European Inventory of Existing Commercial Substances
EC_{50} : Half maximal effective concentration
ENCS : Japan Inventory of Existing and New Chemical Substances
Eti Maden : Eti Maden İşletmeleri Genel Müdürlüğü
IBC Code : International Code for the Construction and Equipment of Ships carrying Dangerous
IECSC : Inventory of Existing Chemical Substances Produced or Imported in China
IECSC : Inventory of Existing Chemical Substances China
Index N° : Atomic number of the element most characteristic of the properties of the substance
KECI : South Korea Existing Chemicals List
LC_{50} : Lethal Concentration, 50%
LD_{50} : Median Lethal Dose
MARPOL 73/78 : International treaty for the prevention of pollution from ships, 1973, as modified in 1978
N.A. : Not Applicable
NZIoC : New Zealand Inventory of Chemicals
OSHA : Occupational Safety & Health Administration
PBT : Persistent, Bioaccumulative and Toxic substance
PEL : Permissible Exposure Limits
PICCS : Philippines Inventory of Chemicals and Chemical Substances
PNEC : Predicted No Effect Concentration
REACH : Registration, Evaluation, Authorisation and Restrictions of Chemicals Regulation (EC) N°1907/2006
SDS : Safety Data Sheet
TLV : Threshold Limit Value
U.S. EPA TSCA: United States Environmental Protection Agency Toxic Substances Control Act
UN : United Nations
vPvB : Very Persistent and Very Bioaccumulative

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

Hazard Statement
H361: Suspected of damaging fertility or the unborn child **H400:** Very toxic to aquatic life **H411:** Toxic to aquatic life with long lasting effects
Precautionary Statements
Prevention **P201:** Obtain special instructions before use. **P202:** Do not handle until all safety precautions have been read and understood. **P273:** Avoid release to the environment. **P280:** Wear protective gloves/protective clothing/eye protection/face protection. **Response** **P308+P313:** If exposed or concerned: get medical advice/attention. **P391:** Collect spillage. **Storage** **P405:** Store locked up. **Disposal** **P501:** Dispose of contents/container to in accordance with local regulations.

16.4. Key literature references and sources for data

[1] Fail PA, George JD, Seely JC, Grizzle TB & Heindel JJ. (1991). Reproductive toxicity of boric acid in Swiss (CD-1) mice: Assessment using the continuous breeding protocol. Fundamental and Applied Toxicology 17: 225 - 239.

[2] Scialli, A.R., Bonde, J.P., Brüske-Hohlfeld, I., Culver, D.B., Li, Y., & Sullivan, F.M. (2010). An overview of male reproductive studies of boron with an emphasis on studies of highly exposed Chinese workers. Reproductive Toxicology, 29(1), 10-24.

[3] Duydu, Y., Başaran, A., & Bolt, H. (2012). Exposure assessment of boron in Bandırma boric acid production plant. Journal of Trace Elements in Medicine and Biology, 26(2-3), 161-164.

[4] Başaran, N., Duydu, Y., & Bolt, H., (2012). Reproductive toxicity in boron exposed workers in Bandırma, Turkey. Journal of Trace Elements in Medicine and Biology, 26(2-3), 165-167.

[5] Daniels CL & Teske RH (1969). Acute toxicity and irritation studies on zinc borate 2335. Testing laboratory: Hill Top Research Inc. Report no.: T-258. Owner company: US Borax Inc. Study number: TX-69-26. Report date: 1969-07-23.

[6] Litovitz T L, Norman S A, Veltri J C, Annual Report of the American Association of Poison Control Centers National Data Collection System. Am. J. Emerg. Med. (1986), 4, 427-458.

[7] Heindel JJ, Price CJ, Field EA, Marr MC, Myers CB, Morrissey RE & Schwetz BA (1992). Developmental toxicity of boric acid in mice and rats. Fundamental and Applied Toxicology 18: 266 - 277.

[8] Price CJ, Marr MC, Myers CB, Heindel JJ & Schwetz BA (1991). Final Report on the Developmental Toxicity of Boric Acid (CAS No 10043-35-3) in New Zealand White Rabbits. National Toxicology Program, National Institute of Environmental Health Sciences. Testing laboratory: National Toxicology Program, National Institute of Environmental Health Sciences (TER 90-003; NTIS Accession No PB92-129550). Report no.: TER 90-003; NTIS Accession No PB92-129550.

[9] Hanstveit, A.O. & Oldersma, H. (2000). Determination of the effect of Boric acid, Manufacturing grade on the growth of the fresh water green alga Selenastrum capricornutum. Testing laboratory: TNO Nutrition and Food Research Institute. Report no.: V99.157. Owner Company: Borax Europe Limited. Study number: IMW-99-9047-05. Report date: 2000-03-06.

[10] Van Ginneken I. (1994). The effect of zinc oxide on the growth of the unicellular green algae Selenastrum capricornutum. draft report. Testing laboratory: Janssen Pharmaceutica Beerse, B. Report no.: AASc/0022. Owner company: International lead and zinc research organisation (ILZRO) now: IZA. Report date: 1994-08-16.

[11] Gersich, FM. (1984a). Evaluation of a Static Renewal Chronic Toxicity Test Method for Daphnia magna straus using boric acid. Environmental Toxicology and Chemistry, 3(1), 89-94.

[12] Palauskis J. D. and Winner R. W. (1988). effects of water hardness and humic acid on zinc toxicity to Daphnia magna Straus. Aquatic Toxicology 12,273-290.

[13] Magliette R. J. (1995). Need for environmental quality guidelines based on ambient freshwater quality criteria in natural waters -case study "zinc". Bull. Environm. Contam. Toxicol. 54, 626-632. Testing laboratory: Merck Research laboratories, P. O. Box 2000, Rahway, New Jersey 07065, USA.

[14] Soucek, D., Dickinson, A., & Major, K. (2010). Acute and chronic toxicity of boron to freshwater organisms. Testing laboratory: Illinois Natural History Survey, University of Illinois, Champaign, Illinois. Owner Company: Illinois Natural History Survey, University of Illinois.

[15] Cairns M. A., Garton R. R. and Tubb R. A. (1982). Use of fish ventilation frequency to estimate chronically safe toxicant concentrations. Trans. Am. Fish. Soc. 111, 70-77.

[16] Buhl K. and Hamilton S. (1990). Comparative toxicity of inorganic contaminants released by placer mining to early life stage salmonids. Ecotoxicology and environmental safety 20, 325-342.

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 SDS 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 suitableness and completeness of such information for his own particular use.

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

Safety Data Sheet Prepared by Arzu DEMİŞ

Certificate Date: 15.12.2018

Certificate Number: TÜV/01.173.02