

# **ETİ-ZnBor**

## **SAFETY DATA SHEET**

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**ETİ MADEN İŞLETMELERİ GENEL MÜDÜRLÜĞÜ**  
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## SECTION 1. Identification of the Substance and the Company

### 1.1. Product identifier

**Substance name** : Dodecaboron tetrazinc dicosaoxide heptahydrate

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

**Chemical name/synonyms**: Zinc borate hydrate, hexaboron dizinc undecaoxide, dodecaboron tetrazinc dicosaoxide 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

<b>Reproductive toxicant, Category 2</b>	H361: Suspected of damaging fertility or the unborn child
<b>Aquatic Acute 1</b>	H400: Very toxic to aquatic life
<b>Aquatic Chronic 2</b>	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<sub>2</sub>O<sub>3</sub> 3.5H<sub>2</sub>O).

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<sup>3</sup>

Cal OSHA/PEL : 10 mg/m<sup>3</sup>

OSHA PEL (total dust) : 15 mg/m<sup>3</sup>

OSHA/PEL (respirable dust) : 5 mg/m<sup>3</sup>

### 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	: $\geq 0.45 \text{ g/cm}^3$

## 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<sub>50</sub> 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<sub>50</sub> –biomass = 40 mg B/L [9]

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

Algal, *Pseudokirchneriella subcapitata* IC<sub>50</sub> (72h) = 0.136 mg Zn/L (Acute studies) [10]

#### **Invertebrate toxicity**

Daphnia, Daphnids, *Daphnia magna*

48-hr LC<sub>50</sub> = 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<sub>50</sub> = 1.22 mg Zn/L (Acute studies) [13]

#### **Fish toxicity**

Fish, Fatheted minnow, *Pimephales promelas*

96-hr LC<sub>50</sub> = 79.7 mg B/L [14]

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

Fish, 96-hr LC<sub>50</sub> = 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 dicosaoxide 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 dicosaoxide 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 (BGBl 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 dicosaoxide heptahydrate: N.A

## 15.2. Chemical safety assessment

Chemical Safety Assessment of dodecaboron tetrazinc dicosaoxide 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	<ul style="list-style-type: none"> <li>• This SDS was updated to include German Water Hazard Class (WGK) info under Section 15.</li> </ul>

### 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

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

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

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

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Safety Data Sheet Prepared by Arzu DEMİŞ

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