



# Potassium Tetraborate

## Section 1 Identification of the substance/mixture and of the Company/undertaking

- 1.1 Product Identifier**
- Chemical name:** Potassium tetraborate tetrahydrate  
**CAS No:** 12045-78-2  
**REACH Registration Number:** 01-2119970730-37-0000  
**EC No:** 215-575-5  
**Product Name:** Potassium Tetraborate  
**Grades:** Technical
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**
- Identified Uses:** Chemical production  
 Complexing agent  
 Corrosion inhibitors and anti-scaling agents  
 Fertilisers  
 Flame retardants  
 Flux agents for casting  
 Laboratory chemicals  
 Lubricants and lubricant additives  
 Photosensitive agents and other photo-chemicals  
 pH-regulating agents  
 Plating agents and metal surface treating agents  
 Process regulator (other than polymerisation or vulcanization processes)  
 Processing aid not otherwise listed  
 Surface active agents  
 Viscosity modifiers  
*A complete list of uses is provided in the introduction to Annex – Exposure Scenarios*
- Uses advised against:** None
- 1.3 Details of the supplier of the SDS**
- Company Name:** **Borax Europe Limited**  
**Address:** 6 St. James's Square  
 London, SW1Y 4AD  
 United Kingdom
- Telephone number:** +44 (0)20 7781 2000
- Email:** [rtm.msds@riotinto.com](mailto:rtm.msds@riotinto.com)
- 1.4 Emergency telephone number:** +44 (0) 1235 239 670  
**Official advisory body telephone number:** None

## Section 2 Hazards identification

### 2.1 Classification of the substance or mixture

**Classification (CLP Regulation (EC) No 1272/2008):** Classified as toxic for reproduction (Repr. 2; H361d).

Potassium tetraborate tetrahydrate has a specific concentration limit of  $\geq 6.8\%$  for toxic to reproduction classification.

**Classification (Directive 67/548/EEC):** Not classified.

Refer to Section 16 for the full text of Hazard Statements mentioned above.

## 2.2 Label Elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

### Hazard Pictograms



**Signal word:** Warning

#### Hazard statements:

H361d: Suspected of damaging the unborn child.

#### Precautionary statements:

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.

P501: Dispose of contents/container in accordance with local regulation.

## 2.3 Other Hazards

H303: May be harmful if swallowed.

# Section 3 Composition/information on ingredients

## 3.1 Substances

Chemical Name	CAS#	EC#	% content	Classification (1272/2008/EC)	Classification (67/548/EEC)
Potassium tetraborate tetrahydrate	12045-78-2	215-575-5	>99.0	Repr. 2; H361d	Not classified

Refer to Section 16 for the full text of Hazard statements mentioned above.

# Section 4 First aid measures

## 4.1 Description of First aid measures

Protection of first-aiders: No special protective clothing is required.

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

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

**Skin contact:** No treatment necessary.

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

## 4.2 Most important symptoms and effects both acute and delayed:

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

- 4.3 Indication of any immediate medical attention and special treatment needed:** Note to physicians: Supportive care only is required for adult ingestion of less than a few grams of the product. For ingestion of larger amounts, maintain fluid and electrolyte balance and maintain adequate kidney function. Gastric lavage is only recommended for heavily exposed, symptomatic patients in whom emesis has not emptied the stomach. Hemodialysis should be reserved for patients with massive acute absorption, especially for patients with compromised renal function. Boron analyses of urine or blood are only useful for verifying exposure and are not useful for evaluating severity of poisoning or as a guide in treatment<sup>1</sup>.

## Section 5 Fire-fighting measures

- 5.1 Extinguishing media**  
**Suitable extinguishing media:** Use extinguishing media that are appropriate to local circumstances and the surrounding environment.
- Unsuitable extinguishing media:** None
- 5.2 Special hazards arising from substance or mixture**  
None. The product is not flammable, combustible or explosive.
- 5.3 Advice for fire fighters**  
Not applicable. The product is itself a flame retardant.

## Section 6 Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures**
- For non-emergency personnel:**  
Eye goggles are not required for normal industrial exposures, but eye protection according to CEN166:1996, respirators according to CEN149:2001 should be considered.
- For emergency responders:**  
Eye goggles are not required for normal industrial exposures, but eye protection according to CEN166:1996, respirators according to CEN149:2001 should be considered.
- 6.2 Environmental precautions:** The product is a water-soluble white powder that may cause damage to trees or vegetation by root absorption. Avoid contamination of water bodies during clean up and disposal. 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 or meets local water quality standards.
- 6.3 Methods and material for containment and cleaning up**
- Appropriate containment:** Avoid spillage into water and cover drains.
- Land spill:** Vacuum, shovel or sweep up and place in containers for disposal in accordance with applicable local regulations.
- Spillage into water:** Where possible, remove any intact containers from the water.
- 6.4 Reference to other sections**  
Refer to sections 8, 12 and 13.

## Section 7 Handling and storage

- 7.1 Precautions for safe handling**  
Good housekeeping procedures should be followed to minimise dust generation and accumulation. Avoid spills. Do not eat, drink and smoke in work areas. Wash hands after use. Remove contaminated clothing and protective equipment before entering eating areas.
- 7.2 Conditions for safe storage, including any incompatibilities**  
No special handling precautions are required, but dry, indoor storage is recommended. To maintain package integrity and to minimise caking of the product, bags should be handled on a first-in first-out basis.

**Storage temperature:** Ambient  
**Storage pressure:** Atmospheric  
**Special sensitivity:** Moisture (Caking)

- 7.3 **Specific end use(s)**  
Refer to Annex – Exposure Scenarios

## Section 8 Exposure controls/personal protection

### 8.1 Control parameters

**Occupational exposure limit values:** In the absence of a national OEL, Rio Tinto Borax recommends and applies internally an Occupational Exposure Limit (OEL) of 1 mg B/m<sup>3</sup>. To convert product into equivalent boron (B) content, multiply by 0.1415.

There is no OEL for potassium tetraborate tetrahydrate (CAS 12045-78-2).

#### DNELs:

Route of exposure	Workers				Consumers			
	Acute effects local	Acute effects systemic	Chronic effects local	Chronic effects systemic	Acute effects local	Acute effects systemic	Chronic effects local	Chronic effects systemic
Oral	Not Required				*	1.20 mg/kg/day	*	1.20 mg/kg/day
Inhalation	*	*	*	10.25 mg/m <sup>3</sup>	*	*	*	5.16 mg/m <sup>3</sup>
Dermal	*	*	*	480.60 mg/kg/day	*	*	*	242.40 mg/kg/day

\* No hazard identified

Monitoring procedure: *BS EN 14042:2003 Title identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.*

#### PNECs:

Compartment (Environment)	PNEC (added values)
Water, fresh and marine	2.02 mg B/L
Water, intermittent	13.7 mg B/L
Air	No exposure expected
Soil	5.4 mg B/kg dry soil
Sediment	Waived due to lack of partitioning to sediment
STP	10 mg B/L

### 8.2 Exposure controls

**Appropriate engineering controls:** Use local exhaust ventilation to keep airborne concentrations of dust below permissible exposure limits.

#### Personal protection equipment:

Eye and face protection: Eye protection according to CEN166:1996 may be warranted if environment is excessively dusty.  
Skin protection: Standard work gloves (cotton, canvas or leather) may be warranted if environment is excessively dusty.  
Respiratory protection: Where airborne concentrations are expected to exceed exposure limits, respirators should be used (CEN149:2001).

#### Environmental exposure controls:

**Limiting releases from site:** Where appropriate, material should be recovered and recycled through the process. Spillages of powder or granulated borates should be swept or vacuumed up immediately and placed in containers for disposal in order to prevent unintentional release to the environment. Waste containing borates should be handled as an hazardous waste and removed by licensed operator to an offsite location where it can be incinerated or disposed to a hazardous landfill.

**Water Emissions:** Storage should be sheltered from precipitation. Avoid spillage into water and cover drains. Removal from water can only be accomplished by very specific treatment technologies including ion exchange resins, reverse osmosis etc. Removal efficiency is dependent upon a number of factors and will vary from 40 to 90%. Much of the technology is currently not appropriate to high volume or mixed waste streams. Boron is not removed in considerable amounts in conventional STP. If sites discharge to a municipal STP the concentration of boron should not exceed the PNEC in the municipal STP.

**Air Emissions:** Emissions to air can be removed by one or more of the following dust-control measures: electrostatic precipitators, cyclones, fabric or bag filters, membrane filters, ceramic and metal mesh filters, and wet scrubbers.

## Section 9 Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

<b>Appearance:</b>	White, crystalline solid
<b>Odour</b>	Odourless
<b>Odour threshold:</b>	Not applicable: odourless
<b>pH @ 20 °C:</b>	9.15 (1.0% solution); 9.2 (5.0% solution)
<b>Melting point/ Freezing point:</b>	>500 °C
<b>Initial boiling point and boiling range:</b>	Not applicable: melting point >300 °C
<b>Flash point:</b>	Not applicable: inorganic substance
<b>Evaporation rate:</b>	Not applicable: non-volatile
<b>Flammability (solid/liquid):</b>	Non-flammable (used as a flame retardant)
<b>Upper/lower flammability or explosive limits:</b>	Not applicable: non-flammable
<b>Vapour pressure:</b>	Not applicable: melting point >300 °C
<b>Vapour density:</b>	Not applicable: melting point >300 °C
<b>Relative density:</b>	1.92
<b>Solubility(ies):</b>	Water: 15.8% @ 20 °C; 63.3% @ 100 °C
<b>Partition coefficient; n-octanol/water:</b>	Not applicable: inorganic substance
<b>Auto-ignition temperature:</b>	Not applicable: not self-heating
<b>Decomposition temperature:</b>	Not applicable: melting point >300 °C
<b>Viscosity:</b>	Not applicable: solid substance
<b>Explosive properties:</b>	Not explosive: does not contain chemical groups associated with explosive properties
<b>Oxidising properties:</b>	Not oxidising: does not contain chemical groups associated with oxidising properties

### 9.2 Other information

<b>Molecular weight:</b>	303.5
<b>Formula:</b>	$K_2B_4O_7 \cdot 4H_2O$

## Section 10 Stability and reactivity

**10.1 Reactivity:** None known.

**10.2 Chemical stability:** Under normal ambient temperatures (-40 °C to +40 °C), the product is stable.

**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 by storing according to good industrial practice.

**10.5 Incompatible materials:** Strong reducing agents.

**10.6 Hazardous decomposition products:** None.

## Section 11 Toxicological Information

### 11.1 Information on toxicological effects

#### (a) Acute toxicity

Method: Acute Oral Toxicity Study – OECD Guideline 401 equivalent

Species: Rat

Dose: 0.46; 1.00; 2.15; 4.64 and 10.0 g/kg bw

Routes of Exposure: Oral

Results: The oral LD<sub>50</sub> value in rats was 3690 mg/kg bw. Based on the available data, the classification criteria are not met.

Method: Acute Dermal Toxicity Study – U.S. EPA FIFRA Guidelines

Species: Rabbit

Dose: 2,000 mg/kg bw boric acid

Routes of Exposure: Dermal

Results: No data on the product itself. Based on a dermal LD50 value with boric acid in rabbits greater than 2000 mg/kg bw, and since potassium tetraborate is not anticipated to have a dermal LD50 value in the range of 2000 – 5000 mg/kg bodyweight, the classification criteria are not met.

Method: Acute Inhalation Toxicity Study – OECD Guideline 403

Species: Rat

Dose: 2.12 mg/L disodium tetraborate pentahydrate

Routes of Exposure: Inhalation

Results: Based on LC50 values in rats for acute inhalation toxicity studies with other borates that were > 2 g /m<sup>3</sup>, the classification criteria are not met.

**(b) Skin corrosion / irritation:**

Method: Primary Dermal Irritation Study – U.S. EPA Guidelines, similar to OECD 404

Species: Rabbit

Dose: 500 mg

Routes of Exposure: Dermal

Results: No irritation. Based on the available data, the classification criteria are not met

**(c) Serious eye damage / irritation:**

Method: Eye Irritation Study – OECD Guideline 405

Species: New Zealand White Rabbit

Dose: 0.1 g

Routes of Exposure: Eye

Results: Not irritating. Based on mean scores <1, and the effects were fully reversible within 72 hours, the classification criteria are not met. Many years of occupational exposure indicate no adverse effects on human eye.

**(d) Respiratory or skin sensitisation:**

Method: Buehler Test - OECD Guideline 406

Species: Guinea Pig

Dose: 0.4 g disodium tetraborate pentahydrate

Routes of Exposure: Dermal

Results: No data on the product itself. There are no data to suggest that potassium pentaborates are skin or respiratory sensitizers. Based on the available data, the classification criteria are not met.

**(e) Germ cell mutagenicity:**

Method: No germ cell mutagenicity studies with the product have been conducted. Several in vitro mutagenicity studies have been carried out on boric acid including gene mutation in mammalian cells, unscheduled DNA synthesis, chromosomal aberration and sister chromatid exchange in mammalian cells.

Species: L5178Y mouse lymphoma, V79 Chinese hamster cells, C3H/10T1/2 cells, hepatocytes, Chinese hamster ovary (CHO cells).

Dose: 1.0 - 10.0 mg/ml (1000 -10000 ppm) boric acid

Routes of Exposure: in vitro

Results: Not mutagenic (based on boric acid). Based on the available data, the classification criteria are not met.

**(f) Carcinogenicity:**

Method: OECD 451 equivalent.

Species: B6C3F1 mice

Dose: 446; 1150 mg boric acid/kg bw/day

Routes of Exposure: Oral feeding study

Results: No evidence of carcinogenicity (based on boric acid). Based on the available data, the classification criteria are not met.

**(g) Reproductive toxicity:**

Method: Three-generation feeding study - Similar to OECD 416 Two-Generation Study

Species: Rat

Dose: 0; 34 (5.9); 100 (17.5); and 336 (58.5) mg boric acid (mg B)/kg bw/day; and 0; 50 (5.9); 155 (17.5); and 518 (58.5) mg borax (mg B)/kg bw/day

Routes of Exposure: Oral feeding study

Results: NOAEL in rats for effects on fertility in males is 100 mg boric acid /kg bw and 155 mg sodium tetraborate decahydrate/kg bw; equivalent to 17.5 mg B/kg bw.

Method: Prenatal Developmental Toxicity Study - OECD Guideline 414

Species: Rat

Dose: 0; 19 (3.3); 36 (6.3); 55 (9.6); 76 (13.3); and 143 (25) mg boric acid (mg B)/kg bw.

Routes of Exposure: Oral feeding study

Results: NOAEL in rats for developmental effects on the foetus including foetal weight loss and minor skeletal variations is 55 mg boric acid/kg bw or 9.6 mg B/kg; equivalent to 64.7 mg disodium tetraborate pentahydrate/kg bw.

Reproductive Toxicity Category 2 (Hazard statement: H361d: Suspected of damaging fertility or the unborn child.)

Method: Occupational studies of evaluating sensitive sperm parameters in highly exposed borate workers. Epidemiological studies evaluating high environmental exposures to boron and developmental effects in humans have been conducted.

Species: Human

Dose: A subset of workers was exposed to 125 mg B/day.

Routes of Exposure: Combined oral ingestion and inhalation

Results: No adverse fertility effects in male workers. Epidemiological studies of human developmental effects have shown an absence of effects in exposed borate workers and populations living in areas with high environmental levels of boron.

#### Summary of evaluation of the CMR properties

Boric acid is not mutagenic and has been tested in 2 year bioassays to be negative for carcinogenicity. Accordingly a classification for these endpoints for disodium tetraborates is not required under EC Directive 67/548/EEC or under CLP Regulation (EC) No. 1272/2008. A multigeneration study in the rat gave a NOAEL for fertility in males of 17.5 mg B/kg/day. Developmental effects have been observed in laboratory animals, the most sensitive species being the rat with a NOAEL of 9.6 mg B/kg bw/day. Disodium tetraborate is classified under the 1st ATP to CLP as Repr. 1B; H360FD. While boron has been shown to adversely affect male reproduction in laboratory animals, there was no clear evidence of male reproductive effects attributable to boron in studies of highly exposed workers. Based on weight of evidence evaluation, classification as Repr. Cat. 2 is justified.

**(h) STOT-single exposure:** No target organ has been identified in humans.

#### (i) STOT-repeated exposure:

Method: Chronic toxicity study of boric acid and disodium tetraborate decahydrate, similar to OECD 452

Species: Rat

Dose: 0; 33 (5.9); 100 (17.5); 334 (58.5) mg boric acid (B)/kg bw per day (nominal in diet); and 0; 52 (5.9); 155 (17.5); 516 (58.5) mg borax (B)/kg/day (nominal in diet)

Routes of Exposure: Oral feeding study

Results: A NOAEL of 17.5 mg B/kg bw/day was determined in a chronic feeding study (2 years) in rats and is based on testes effects. Other effects (kidney, haemopoietic system) are regarded only at even higher dose levels. Based on the available data, the classification criteria are not met.

**(j) Aspiration hazard:** Physical form of solid powder indicates no aspiration hazard potential.

#### Toxicokinetics

In the blood boric acid is the main species present and is not further metabolised. Boric acid is distributed rapidly and evenly through the body, with concentrations in bone 2 - 3 higher than in other tissues. Boric acid is excreted rapidly, with elimination half-lives of 1 h in the mouse, 3 h in the rat and < 27.8 h in humans, and has low potential for accumulation. Boric acid is mainly excreted in the urine. Absorption of borates via the oral route is nearly 100 %. For the inhalation route also 100 % absorption is assumed as worst case scenario. Dermal absorption through intact skin is very low with a percent dose absorbed of < 0.5 %.

#### Information on likely routes of exposure:

Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because product is poorly absorbed through intact skin. Product is *not* intended for ingestion.

#### Symptoms related to the physical, and chemical and toxicological characteristics:

At high concentrations irritation of nose, throat and eye may be observed. Products are *not* intended for ingestion. Small amounts (e.g. a teaspoonful) swallowed accidentally are not likely to cause effects. Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

#### Delayed and immediate effects as well as chronic effects from short and long-term exposure:

Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid and sodium borate dust. Human epidemiological studies indicate no effect on fertility in occupational populations with chronic exposures to borate dust and indicate no effect to a general population with high exposures to borates in the environment.

## Section 12 Ecological information

### 12.1 Toxicity

Note that the data values are expressed as boron equivalents. To convert to this product divide the boron equivalent by 0.1415. Studies judged to be unreliable or with insufficient information to evaluate are not included.

### Freshwater

#### Chronic studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Algal	4	10 mg B/L ( <i>Chlorella pyrenoidosa</i> ) to 50 mg B/L ( <i>Anacystis nidulans</i> )	3, 4
Higher plants	3	4.0 mg B/L ( <i>Phragmites australis</i> ) to 60 mg B/L ( <i>Lemna minor</i> )	5, 6
Invertebrate and protozoan	7	5.7 mg B/L ( <i>Daphnia magna</i> ) to 32 mg B/L ( <i>Chironomus riparius</i> )	7, 8
Fish	6	2.9 mg B/L ( <i>Micropterus salmoides</i> ) to 17 mg B/L ( <i>Carassius auratus</i> )	9
Amphibian	2	29 mg B/L ( <i>Rana pipiens</i> ) to 41 mg B/L ( <i>Bufo fowleri</i> )	9

Results<sup>2</sup>: Based on the complete data set of 22 species, the HC<sub>5</sub> value of the species sensitivity distribution is 4.05 mg B/L.

#### Acute studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric EC/LC50)	References
Algal	2	10 mg B/L ( <i>Chlorella pyrenoidosa</i> ) to 28 mg B/L ( <i>Selenastrum capricornutum</i> )	3, 10
Invertebrate and protozoan	9	113 mg B/L ( <i>Ceriodaphnia dubia</i> ) to 1376 mg B/L ( <i>Chironomus decorus</i> )	11, 12
Fish	7	80 mg B/L ( <i>Pimephales promelas</i> ) to 627 mg B/L ( <i>Onchorhynchus tschawytscha</i> )	11, 13
Amphibian	2	86 mg B/L ( <i>Rana pipiens</i> ) to 104 mg B/L ( <i>Bufo fowleri</i> )	9

Results<sup>2</sup>: Based on the complete data set from 46 studies with 20 species, the HC<sub>5</sub> value of the species sensitivity distribution is 27.3 mg B/L.

Classification: Based on the acute data for freshwater species, this substance is not classified as hazardous to the environment.

### Marine and Estuarine Data

#### Chronic studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Algal	19	5 mg B/L ( <i>Emiliana huxleyi</i> ) to >100 mg B/L ( <i>Agmenellum quadruplicatum</i> , <i>Anacystis marina</i> , <i>Thalassiosira pseudonana</i> )	4

Results: No data are available for invertebrate or vertebrate species. The results from the freshwater data set are recommended as applicable to marine and estuarine species.

#### Acute studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric EC/LC50)	References
Invertebrate	3	45 mg B/L ( <i>Litopenaeus vannamei</i> ) to 83 mg B/L ( <i>Americamysis bahia</i> )	14, 15
Fish	2	74 mg B/L ( <i>Limanda limanda</i> ) to 600 mg B/L ( <i>Oncorhynchus tschawytscha</i> )	13, 16

No data are available for algal species.



**Sediment**

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric EC/LC50)	References
Invertebrate	1	82.4 mg B/kg sediment dw ( <i>Chironomus riparius</i> )	17, 18

Results: Although limited, the data suggest that sediment organisms are within range of toxicity of aquatic organisms. In addition, the substance will not partition to the sediment, so a sediment/water partitioning approach is justified.

**Sewage Treatment Plants (STP)**

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Activated sludge	NA	>17.5 mg B/L to 100 mg B/L	19
Microbes	3	10 mg B/L ( <i>Opercularia bimarginata</i> ) to 20 mg B/L ( <i>Paramecium caudatum</i> )	20

**Terrestrial Data**

Chronic studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Plant	28	7.2 mg B/kg dw ( <i>Zea mays</i> ) to 56 mg B/kg dw ( <i>Allium cepa</i> )	21, 22
Invertebrates	9	15.4 mg B/kg dw ( <i>Folsomia candida</i> ) to 87 mg B/kg dw ( <i>Caenorhabditis elegans</i> )	23, 24
Soil micro	3	12 mg B/kg dw (nitrogen mineralization and nitrification test) to 420 mg B/kg dw (soil nitrogen transformation test)	25, 26

Results<sup>2</sup>: Based on the complete data set, the HC<sub>5</sub> value of the species sensitivity distribution is 10.8 mg B/kg dw.

**Phytotoxicity:** Boron is an essential micronutrient for healthy growth of plants. 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.

**12.2 Persistence and Degradability**

Biodegradation is not an applicable endpoint since the product is an inorganic substance.

**12.3 Bioaccumulative potential**

This product will undergo hydrolysis in water to form undissociated boric acid. Boric acid will not biomagnify through the foodchain. Octanol/Water partition coefficient: Log P<sub>ow</sub> = -0.7570 @ 25 °C (based on boric acid).

**12.4 Mobility in soil**

The product is soluble in water and is leachable through normal soil. Adsorption to soils or sediments is insignificant.

**12.5 Results of PBT and vPvB assessment**

According to Annex XIII of REACH, criteria for the assessment of PBT and vPvB properties do not apply to inorganic substances.

**12.6 Other adverse effects**

None

**Section 13 Disposal considerations****13.1 Waste treatment methods**

This product is classified as toxic to reproduction (Repr. 2) and falls within scope of Directive 2008/98/EC as hazardous waste (H10). Dispose via a licensed waste disposal contractor.

Product packaging should be recycled where possible.

Local authorities should be consulted about any specific local requirements.

Such product should, if possible, be used for an appropriate application.

## Section 14 Transport information

Transport Classification for Road (ADR) / Rail (RID); Inland waterways (ADN); Sea (IMDG); Air (ICAO/IATA)

14.1 UN Number:	Not Regulated
14.2 UN Proper Shipping Name:	Not Regulated
14.3 Transport hazard class(es):	Not Regulated
14.4 Packing Group:	Not Regulated
14.5 Environmental Hazards	Not Regulated
14.6 Special precautions for user:	Not Regulated
14.7 Transport in bulk according to Annex II of Marpol 73/78 and the IBC code:	Not Regulated

## Section 15 Regulatory information

### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

**Regulation (EC) No 2037/2000 - Substances that deplete the ozone layer:** Not manufactured with and does not contain any Group I or Group II ozone depleting substances.

**Clean Air Act (Montreal Protocol) - Substances that deplete the ozone layer:** Not manufactured with and does not contain any Class I or Class II ozone depleting substances.

**Regulation (EC) No 689/2008 - Export and Import of Dangerous Chemicals:** Not listed.

**National Regulations:** Ensure all national/local regulations are observed.

**Chemical inventory listing:** The listing is sometimes under the Inventory number of the anhydrous form of this inorganic salt.

<b>U.S. EPA TSCA Inventory:</b>	1332-77-0
<b>Canada DSL:</b>	1332-77-0
<b>EINECS:</b>	215-575-5
<b>South Korea KECI:</b>	1-530
<b>Japan METI &amp; ISHL:</b>	(1)-66

### 15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out.

## Section 16 Other information

### Revision Details:

Section 1: Supplier address; Emergency telephone number.

### Abbreviations and acronyms:

ATP: Adaption to Technical Progress

CLP: Classification, Labelling and Packaging Regulation (EC) No. 1272/2008

CMR: Carcinogen, Mutagen, Reproductive Toxin

EC: Effect concentration

HC: Hazard Concentration

LC: Lethal Concentration

LD: Lethal Dose

STOT: Specific Target Organ Toxicity

DNEL: Derived No Effect Level

LOEC: Lowest Observed Effect Concentration

NA: Not applicable.

NOAEL: No observed adverse effect level

NOEC: No Observed Effect Concentration

PNEC: Predicted No Effect Concentration

PBT: Persistent, Bioaccumulative and Toxic

vPvB: very Persistent, very Bioaccumulative

TWA: Time Weighted Average

STEL: Short-term exposure limit

STP: Sewage Treatment Plant

#### 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. Chemical Safety Report "Potassium tetraborate tetrahydrate" May 2013, <http://apps.echa.europa.eu/registered/registered-sub.aspx#search>
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For general information on the toxicology of borates see Patty's Toxicology, 6th Edition Vol. I, (2012) Chap. 23, 'Boron'

#### Full text of Hazard statements mentioned in sections 2 and 3:

H361d: Suspected of damaging the unborn child.

#### Precautionary statements:

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.

P501: Dispose of contents/container in accordance with local regulation.

#### Precautionary Phrases:

Do not ingest.

Keep out of reach of children.

Refer to safety data sheet.

Not for use in food, drugs or pesticides.

#### Disclaimer:

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The following table lists the uses identified and registered for this substance. Each use has a number of applicable human health, environmental and consumer exposure scenarios. These can be found at [www.borax.com/EU-REACH/exposure-scenarios](http://www.borax.com/EU-REACH/exposure-scenarios)

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
1	Production and Import	Production and Import	X					3,8,9	1,7,8,9a,9b, 12,14,15, 17,18,19, 20,21,23, 24,25,26, 29,30,32, 37,38,39	1, 2, 3, 4, 8a, 8b, 9, 14, 15	-	1, 6a	E1 - Importing, manufacture, refining and packaging of borates	ES3 - Refining and processing of borates ES14 - Loading of road tankers ES19 - Packaging into bags (25-50kg) ES20 - Packaging into big bags (750-1500kg) ES21 - General maintenance activities ES32 - Working in a laboratory ES41 - Working in a warehouse
6	Adhesives	Formulation of borates in adhesives		X				6a, 6b, 9, 11	1	3, 4, 5, 8a, 8b, 9, 14	-	2	E7 - Formulation into of borates into adhesives	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substance or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES22 - Transfer of substances into small containers ES31 - Compaction and tableting of borate-containing powders ES32 - Working in a laboratory
7	Adhesives	Industrial use of adhesives			X		X	3, 6a, 6b, 16, 17, 18, 19	1	2, 4, 5, 7, 8b, 9, 10, 13, 14	-	5	E12 - Industrial use of adhesives containing borate compounds	ES6 - Industrial application of adhesive ES18 - Transfer of substance or preparations from/to large vessels/containers at dedicated facilities ES26 - Professional application of adhesives
8	Adhesives	Consumer use of articles containing adhesives				X	X	21	-	-	8	10a, 11a	E27 - Generic wide dispersive use of articles containing borates with low release	ESC2 - Consumer mouthing of cardboard and oral contact with boron-containing adhesives

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
9	Agriculture	Formulation of borates in fertilizers		X				1, 3	12	2, 3, 4, 5, 8b, 9, 14	-	2	E4 - Generic formulation of borates into mixtures	<p><b>ES7</b> - Discharging bags (25 -50 kg) into mixing vessels</p> <p><b>ES8</b> - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p><b>ES16</b> - Closed production at ambient temperatures</p> <p><b>ES18</b> - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p><b>ES21</b> - General maintenance activities</p> <p><b>ES22</b> - Transfer of substances into small containers</p> <p><b>ES31</b> - Compaction and tableting of borate-containing powders</p> <p><b>ES32</b> - Working in a laboratory</p>
10	Agriculture	Professional use of fertilizers			X			1, 22	12	2, 3, 4, 5, 8a, 8b, 9, 11, 13	-	8a, 8c, 8d, 8f	E24 - Wide dispersive use of fertilizers containing borates	<p><b>ES5</b> - Fertigation using boron-containing liquid fertiliser</p> <p><b>ES10</b> - Transfer of boron-containing granular fertiliser</p> <p><b>ES23</b> - Transfer of boron-containing liquid foliar fertiliser</p> <p><b>ES27</b> - Spreading of boron-containing granular fertiliser</p> <p><b>ES28</b> - Application of boron-containing liquid foliar fertiliser</p>
11	Agriculture	Consumer use of fertilizers				X		21	19	-	-	8a, 8c, 8d, 8f	E24 - Wide dispersive use of fertilizers containing borates	<b>ESC3</b> - Consumer use of boron-containing fertiliser

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IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
12	Analytical reagent	Formulation into analytical reagents		X				3	21	2, 3, 4, 5, 8b, 9, 15, 19	-	2	E4 - Generic formulation of borates into mixtures	<p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES16 - Closed production at ambient temperatures</p> <p>ES21 - General maintenance activities</p> <p>ES22 - Transfer of substances into small containers</p> <p>ES32 - Working in a laboratory</p>
13	Analytical reagent	Laboratory use of analytical reagent			X			3,22	21	15	-	8a, b, d, e	E22 - Generic environmental exposure scenario for use of borates in laboratories as analytical reagent	ES32 - Working in a laboratory
21	Chemical synthesis	Manufacture of new chemicals using borates	X					3, 8, 9	19	2, 3, 4, 5, 8b, 9, 13, 15, 19, 21	-	1, 6a	E2 - Generic industrial use of borates resulting in the manufacture of another substance	<p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES16 - Closed production at ambient temperatures</p> <p>ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES22 - Transfer of substances into small containers</p> <p>ES31 - Compaction and tableting of borate-containing powders</p> <p>ES32 - Working in a laboratory</p>

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
22	Coatings	Formulation of paints and coatings		X				3, 7, 8, 10	9a, 18	1,2, 3, 4, 8a, 8b, 9, 15	--	2	E6 - Formulation of borates into paints and coatings	<p><b>ES7</b> - Discharging bags (25 -50 kg) into mixing vessels</p> <p><b>ES8</b> - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p><b>ES16</b> - Closed production at ambient temperatures</p> <p><b>ES18</b> - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p><b>ES21</b> - General maintenance activities</p> <p><b>ES22</b> - Transfer of substances into small containers</p> <p><b>ES31</b> - Compaction and tableting of borate-containing powders</p> <p><b>ES32</b> - Working in a laboratory</p>
23	Coatings	Industrial use of paints and coatings			X			3, 7	9a, 18	7, 8b, 9, 10, 13	-	5	E13 - Industrial use of paints and coatings containing borate compounds	<b>ES11</b> - Industrial use of paints and coatings.
24	Coatings	Professional use of paints and coatings			X			22	9a, 18	5, 8a, 8b, 9, 10, 11, 13, 19		8c, 8f	E25 - Wide dispersive use of paints and coatings containing borates	<b>ES25</b> - Professional use of paints and coatings



IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
30	Detergents	Formulation into detergents		X				3, 10	35	2, 3, 4, 5, 8b, 9, 15	-	2	E5 - Formulation of borates into detergents	<p><b>ES7</b> - Discharging bags (25 -50 kg) into mixing vessels</p> <p><b>ES8</b> - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p><b>ES16</b> - Closed production activities at ambient temperatures</p> <p><b>ES18</b> - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p><b>ES21</b> - General maintenance activities</p> <p><b>ES22</b> - Transfer of substances into small containers</p> <p><b>ES31</b> - Compaction and tableting of borate-containing powders</p> <p><b>ES32</b> - Working in a laboratory</p>
31	Detergents	Professional use of detergents			X			22	35	1, 2, 3, 11, 10, 13, 19	-	8a, 8c, 8d, 8f	E23 - Generic wide dispersive use of borates with 100% release to water	<b>ES4</b> - Use of fabric detergents in industrial or professional settings
32	Detergents	Consumer use of detergents				X		21	35	-	-	8a, 8c, 8d, 8f	E23 - Generic wide dispersive use of borates with 100% release to water	<b>ESC1</b> - Consumer use of boron-containing detergents
35	Glass	Production of low alkali glass	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	E16 - Industrial use of borates during the manufacture of low alkali glass	<p><b>ES2</b> - Closed or largely closed production at high temperatures</p> <p><b>ES16</b> - Closed production at ambient temperatures</p> <p><b>ES18</b> - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p><b>ES21</b> - General maintenance activities</p> <p><b>ES32</b> - Working in a laboratory</p>

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
36	Industrial fluids	Formulation of borates into industrial fluids		X				3, 8, 9, 10,15	20, 24, 25	3, 4, 5, 8b, 9		2	E4 - Generic formulation of borates into mixtures	<p><b>ES2</b> - Closed or largely closed production at high temperatures</p> <p><b>ES7</b> - Discharging bags (25 -50 kg) into mixing vessels</p> <p><b>ES8</b> - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p><b>ES16</b> - Closed production at ambient temperatures</p> <p><b>ES18</b> - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p><b>ES21</b> - General maintenance activities</p> <p><b>ES22</b> - Transfer of substances into small containers</p> <p><b>ES32</b> - Working in a laboratory</p>

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IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
37	Industrial fluids	Industrial use of industrial fluids		X	X			3, 15, 17	19, 20, 24, 25	1, 2, 4, 6, 7, 8a, 8b, 9, 10, 13, 16, 17, 18, 19, 20 21, 22, 23, 24, 26	-	2, 4, 5, 7	<p><b>E4</b> - Generic formulation of borates into mixtures</p> <p><b>E9</b> - Generic industrial use of borates as processing aids in processes and products</p> <p><b>E11</b> - Generic industrial use of borates resulting in inclusion into or onto a matrix</p> <p><b>E18</b> - Generic industrial use of borates in closed systems</p>	<p><b>ES2</b> - Closed or largely closed production at high temperatures</p> <p><b>ES7</b> - Discharging bags (25 -50 kg) into mixing vessels</p> <p><b>ES8</b> - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p><b>ES9</b> - Diluting metal working fluid concentrate with water</p> <p><b>ES12</b> - Use of cleaners in industrial or professional settings</p> <p><b>ES16</b> - Closed production at ambient temperatures</p> <p><b>ES17</b> - Make up of treatment baths for galvanising, plating and other surface treatments</p> <p><b>ES18</b> - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p><b>ES21</b> - General maintenance activities</p> <p><b>ES22</b> - Transfer of substances into small containers</p> <p><b>ES29</b> - Galvanising, plating and other surface treatments of metal articles (including cleaning processes)</p> <p><b>ES32</b> - Working in a laboratory</p> <p><b>ES33</b> - Use of metal working fluids in machining</p> <p><b>ES34</b> - Greasing at high energy conditions</p>
38	Industrial fluids	Consumer use of automotive fluids				x		21	4, 16, 24	-	-	9a, 9b	<p><b>E27</b> - Generic wide dispersive use of articles containing borates with low release</p>	<p><b>ESC8</b> - Consumer exposure for the use of automotive fluids</p>

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
40	Metallurgy	Manufacture of flux mixtures and pastes	X	X				3, 10, 13	38	3, 4, 5, 8b, 9, 14	-	2	E4 - Generic formulation of borates into mixtures	<p><b>ES2</b> - Closed or largely closed production at high temperatures</p> <p><b>ES7</b> - Discharging bags (25 -50 kg) into mixing vessels</p> <p><b>ES8</b> - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p><b>ES16</b> - Closed production activities at ambient temperatures</p> <p><b>ES18</b> - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p><b>ES21</b> - General maintenance activities</p> <p><b>ES22</b> - Transfer of substances into small containers</p> <p><b>ES32</b> - Working in a laboratory</p>
41	Metallurgy	Industrial use of fluxes for (Precious) Metal smelting			X			3, 14	7, 19	22	7	6b	E2 - Generic industrial use of borates resulting in the manufacture of another substance	<p><b>ES2</b> - Closed or largely closed production at high temperatures</p> <p><b>ES7</b> - Discharging bags (25 -50 kg) into mixing vessels</p> <p><b>ES8</b> - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p><b>ES18</b> - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p><b>ES21</b> - General maintenance activities</p> <p><b>ES32</b> - Working in a laboratory</p>
42	Metallurgy	Industrial use of flux pastes for coating brazing and welding rods			X			3,10	38	14	7	5	E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix	<b>ES24</b> - Industrial use of flux pastes to coat welding/brazing rods
43	Metallurgy	Industrial/Professional Use of welding, brazing or soldering rods			X			3, 14, 15, 17, 19	38	13, 25, 26	-	4	E9 - Generic industrial use of borates as processing aids in processes and products	<b>ES40</b> - Industrial and professional use of fluxes in welding/brazing

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IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
44	Metallurgy	Use of borates in metal treatment (plating, passivation, galvanising etc)			X			3, 15, 17	14	2,3,4,5,7, 8a, 8b, 10, 19	-	4	E9 - Generic industrial use of borates as processing aids in processes and products	ES12 - Use of cleaners in industrial or professional settings ES17 - Make up of treatment baths for galvanising, plating and other surface treatments ES29 - Galvanising, plating and other surface treatments of metal articles (including cleaning processes)
46	Nuclear applications	Industrial use of borates in closed nuclear system			X			23	37	1, 2, 8b	-	7	E19 - Industrial use of borates in nuclear power plants with release to water E20 - Industrial use of borates in nuclear power plants without release to water	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES32 - Working in a laboratory
47	Oil industry	Formulation into cement		X				2b	K35100	2, 3, 8b	-	2	E4 - Generic formulation of borates into mixtures	ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES32 - Working in a laboratory
48	Oil industry	Industrial use of cement			X			2b	K35100	8b, 4	-	5	E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix	ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES32 - Working in a laboratory

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IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
49	Photography	Formulation into photographic solutions		X				3, 10	20 30	4, 5, 8b, 9	-	2	E4 - Generic formulation of borates into mixtures	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES22 - Transfer of substances into small containers
50	Photography	Industrial use of photographic solutions			X			3	30	19	-	4	E9 - Generic industrial use of borates as processing aids in processes and products	ES35 - Make up of stock solution for photographic applications
51	Photography	Professional use of photographic solutions			X			22	30	13, 19	-	8a	E23 - Generic wide dispersive use of borates with 100% release to water	ES30 - Use of developer and fixer solutions ES35 - Make up of stock solution for photographic applications
53	Printing paper	Formulation of borate PVA solutions		X				3, 10	20	4, 5, 8b	-	1, 6a, 6b	E2 - Generic industrial use of borates resulting in the manufacture of another substance	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels

**Note:** The IU number as well as the Exposure Scenarios numbering is correct. Even if the numbering might be inconsistent in some cases, this is not a mistake. There are no documents missing.