

Safety Data Sheet

REVISION: June 2016

Supersedes: May 2012 version



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

- 1.1 Product Identifier**
- Chemical name:** Sodium tetraborate pentahydrate
CAS No: 12179-04-3
REACH Registration Number: 01-2119490790-32-0000
EC No: 215-540-4
Synonyms: Disodium tetraborate pentahydrate, Borax 5 Mol, Borax pentahydrate
Product Name: Fertibor
Grades: Technical
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**
- Identified Uses:** Fertilisers
Uses advised against: Consumer uses above the specific concentration limit.
- 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
- 1.4 Emergency telephone number:** **+44 (0) 1235 235 670**
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. 1B; H360FD) and as an eye irritant (Eye Irrit. 2; H319).

Sodium tetraborate pentahydrate has a specific concentration limit of $\geq 6.5\%$ for toxic for reproduction classification and $\geq 10\%$ for eye irritant classification.

Classification (Directive 67/548/EEC): Classified as toxic for reproduction (Repr. Cat 2; R60-61) and as an eye irritant (Xi; R36).

Sodium tetraborate pentahydrate has a specific concentration limit of $\geq 6.5\%$ for toxic for reproduction classification and $\geq 20\%$ for eye irritant classification.

Refer to Section 16 for the full text of Hazard Statements and R-phrases mentioned above.

2.2 Label Elements

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

Hazard Pictograms



Signal word: Danger

Hazard statements:

H360FD: May damage fertility. May damage the unborn child.

H319: Causes serious eye irritation.

Precautionary statements:

P202: Do not handle until all safety precautions have been read and understood.

P281: Use personal protective equipment as required.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P308+P313: IF exposed or concerned: Get medical advice.

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

Supplemental Information

Restricted to professional users.

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)
Sodium tetraborate pentahydrate	12179-04-3	215-540-4	>99.0	Repr. 1B; H360FD Eye Irrit. 2; H319	Repr. Cat 2; R60-61 Xi; R36

Refer to Section 16 for the full text of Hazard statements and R-phrases 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 treatment¹.

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 precaution, protective equipment and emergency procedures

For non-emergency personnel:

Eye protection according to CEN166:1996, Respirators (CEN149).

For emergency responders:

Eye protection according to CEN166:1996, Respirators (CEN149).

- 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/m³. To convert product into equivalent boron (B) content, multiply by 0.1484.

OELs of Member States of the EEA

Substance: Disodium tetraborate pentahydrate, CAS#: 12179-04-3

Country	8-hr TWA OEL (mg/m ³)	15 min STEL (mg/m ³)	Legal basis
Belgium	2	6	Moniteur Belge no. 187, 30 June 2011
Denmark	1	-	Arbejdstilsynet. Grænseværdier for stoffer og materialer), An 2 & 3, Exec. Order No. 1134, 1-12-2011
France	1	-	Valeurs limites d'exposition professionnelle aux agents chimiques en France, INRS, 10-01-2008
Germany	3	6	TRGS 900 Arbeitsplatzgrenzwerte, 12-01-2012
Greece	10	-	Decree No. 339/2001, 9-10-2001
Iceland	1	-	Regulation 390/2009 on Pollution Limits and Measures to Reduce Pollution at the Workplace, 2-04-2009
Ireland	1	-	2011 Code of Practice for the Safety, Health and Welfare at Work [Chemical Agents] Regulations 2001, (S.I. No. 619 of 2001)
Italy	2	6	Decree n 106, 3-08-2009
Norway	1	-	Administrative normer for forurensning i arbeidsatmosfære 2003] No. 361, as amended through December 2011
Portugal	1	-	NP 1796-2004, Valores limite de exposição (VLE) profissional a agentes químicos 3rd edition June 2004
Spain	1	-	Valores Límites Ambientales (VLAs), Límites de Exposición Profesional para Agentes Químicos 2011
Switzerland	1	1	Limit Values at the Workplace 2011, as per SUVA
UK	1	-	Health and Safety Executive, EH40/2005. Occupational Exposure Limits 2 nd Edition, 2011.

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				*	1.15 mg/kg/day	*	1.15 mg/kg/day
Inhalation	17.04 mg/m ³	*	17.04 mg/m ³	9.8 mg/m ³	17.04 mg/m ³	*	17.04 mg/m ³	4.9 mg/m ³
Dermal	*	*	*	458.2 mg/kg/day	*	*	*	231.8 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

Sediment	Waived due to lack of partitioning to sediment
STP	10 mg B/L
Soil	5.4 mg B/kg dry soil

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 is required.

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).

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 a 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

Appearance:	White, crystalline solid
Odour	Odourless
Odour threshold:	Not applicable: odourless
pH @ 20 °C:	9.23 (3.5% solution)
Melting point/ Freezing point:	>1000 °C
Initial boiling point and boiling range:	Not applicable: melting point >300 °C
Flash point:	Not applicable: inorganic substance
Evaporation rate:	Not applicable: non-volatile

Flammability:	Non-flammable (used as a flame retardant)
Upper/lower flammability or explosive limits:	Not applicable: non-flammable
Vapour pressure:	Not applicable: melting point >300 °C
Vapour density:	Not applicable: melting point >300 °C
Relative density:	2.35@26 °C for anhydrous; 1.72@23 °C for decahydrate
Solubility(ies):	Water: 49.74 g/L @ 20 °C (based on decahydrate)
Partition coefficient; n-octanol/water:	Log P _{ow} = -1.53 @ 22 °C (based on decahydrate)
Auto-ignition temperature:	Not applicable: not self-heating
Decomposition temperature:	Not applicable: melting point >300 °C
Viscosity:	Not applicable: solid substance
Explosive properties:	Not explosive: does not contain chemical groups associated with explosive properties
Oxidising properties:	Not oxidising: does not contain chemical groups associated with oxidising properties

9.2 Other information

Molecular weight:	291.35
Formula:	Na ₂ B ₄ O ₇ · 5H ₂ O

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. When heated it loses water, eventually forming anhydrous borax (Na₂B₄O₇).
- 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 – U.S. EPA FIFRA Guidelines Species:

Rat

Dose: 3,200 - 3,400 mg/kg of body weight Routes

of Exposure: Oral

Results: Low acute oral toxicity. LD₅₀ in rats is 3,305 mg/kg of body weight. 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

Routes of Exposure: Dermal

Results: Low acute dermal toxicity; LD₅₀ in rabbits is > 2,000 mg/kg of body weight. Poorly absorbed through intact skin. Based on the available data, the classification criteria are not met.

Method: Acute Inhalation Toxicity Study – OECD Guideline 403 Species:

Rat

Dose: 2.12 mg/L

Routes of Exposure: Inhalation

Results: Low acute inhalation toxicity; LC₅₀ in rats is > 2.0 mg/l (or g/m³). Based on the available data, the classification criteria are not met.

(b) Skin corrosion / irritation:

Method: Primary Dermal Irritation Study – U.S. EPA FIFRA Guidelines

Species: New Zealand White Rabbit

Dose: 0.5 g moistened with saline Routes

of Exposure: Dermal

Results: No skin irritation. Mean Primary Irritation Score: 0. Based on the available data, the classification criteria are not met.

(c) Serious eye damage / irritation:

Method: Eye Irritation Study – similar to OECD Guideline 405

Species: New Zealand White Rabbit

Dose: 0.08 ml equivalent

Routes of Exposure: Eye

Results: Irritating, fully reversible in 14 days.

Classification: Eye Irritation Category 2 (Hazard statement: H319: Causes serious eye irritation.) 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

Routes of Exposure: Dermal

Results: Not a skin sensitizer. No respiratory sensitisation studies have been conducted. There are no data to suggest that disodium tetraborates are respiratory sensitizers. Based on the available data, the classification criteria are not met.

(e) Germ cell mutagenicity:

Method: 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.

Classification: Reproductive Toxicity Category 1B (Hazard statement: H360FD: May damage 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.

(h) STOT-single exposure:

Method: Standard Test Method for Estimating Sensory Irritancy of Airborne Chemicals - ASTM E981-04 (2004) Species: Mouse

Dose: 186 – 1704 mg/m³

Routes of Exposure: Inhalation

Results: The maximum exposure of 1704 mg/m³ resulted in a reduced respiratory rate of 33%, graded as moderate irritation. The lowest exposure tested of 186 mg/m³ sodium tetraborate pentahydrate resulted in a reduced respiration rate of 11%, graded as no irritation. Based on the available data, the classification criteria are not met.

Method: Sensory irritation in human volunteers

Species: Human

Dose: 5 - 40 mg/m³

Routes of Exposure: Inhalation

Results: A NOAEL for irritation from sodium tetraborate pentahydrate of 10 mg/m³ among male and female human volunteers under controlled laboratory conditions. At 10 mg/m³ increased nasal secretion was observed, but occurred in the absence of other irritating effects at a concentration below that considered irritating by volunteers and was not seen in a subsequent study.

(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 equivalent to 118 mg sodium tetraborate pentahydrate/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 0.1484. 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

Results²: Based on the complete data set of 22 species, the HC₅ 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 tshawytscha</i>)	11, 13
Amphibian	2	86 mg B/L (<i>Rana pipiens</i>) to 104 mg B/L (<i>Bufo fowleri</i>)	9

Results²: Based on the complete data set from 46 studies with 20 species, the HC₅ 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 tshawytscha</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

Results²: Based on the complete data set, the HC₅ 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_{ow} = -0.7570 @ 25°C (based on boric acid)²⁷.

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. 1B) 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.

Regulation (EU) No 109/2012 – REACH Annex XVII: Restricted to professional users. The product is permitted for use in consumer products where it is below the specific concentration limit.

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.

U.S. EPA TSCA Inventory:	1330-43-4
Canada DSL:	1330-43-4
EINECS:	215-540-4
South Korea KECl:	KE-12384
Japan METI & ISHL:	(1)-69
China IECSC:	12179-04-3

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

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For general information on the toxicology of borates see ECETOC Technical Report No. 63 (1995); Patty's Toxicology, 6th Edition Vol. I, (2012) Chap. 23, 'Boron'. Culver, BD & Hubbard SA (1995) Inorganic Boron Health Effects in Humans: An Aid to Risk Assessment and Clinical Judgment. Trace Elements in Experimental Medicine 9(4):175-184.

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

H319: Causes serious eye irritation.

H360FD: May damage fertility. May damage the unborn child.

Full text of Risk Phrases mentioned in sections 2 and 3:

R36 Irritating to eyes.

R60 May impair fertility.

R61 May cause harm to 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.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

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

Precautionary Phrases: Restricted

to professional users.

Do not ingest.

Keep out of reach of children.

Refer to safety data sheet.

Not for use in drugs, pesticides or for food preservation.

The table in Annex – Exposure Scenarios lists the uses identified and registered for this substance with the indication of the Exposure Scenario(s) that is relevant to each identified use.

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Annex

Exposure Scenarios

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

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>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 ES22 - Transfer of substances into small containers</p> <p>ES31 - Compaction and tableting of boratecontaining powders</p> <p>ES32 - 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>ES5 - Fertigation using boron-containing liquid fertiliser</p> <p>ES10 - Transfer of boron-containing granular fertiliser</p> <p>ES23 - Transfer of boron-containing liquid foliar fertiliser</p> <p>ES27 - Spreading of boron-containing granular fertiliser</p> <p>ES28 - 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	ESC3 - Consumer use of boron-containing fertiliser
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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.