

SAFETY DATA SHEET



SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name : **Firebrake® ZB**
Chemical name : Hexaboron dizinc undecaoxide, hydrate
EC number : 235-804-2
REACH Registration number

Registration number	Legal entity
01-2119691658-19-0000	Rio Tinto Iron & Titanium GmbH (5)

CAS number : 138265-88-0
Product type : Solid.
Other means of identification : Zinc Borate 2335

1.2 Relevant identified uses of the substance or mixture and uses advised against

Material uses : Refer to the table "Identified uses" below.

Identified uses
Anticorrosive adhesion promoter Anti-tracking (prevention of electrical breakdown over the surface of polymer insulators) Corrosion inhibitors and anti-scaling agents Flame retardants
<i>A complete list of uses is provided in the introduction to Annex - Exposure Scenarios</i>

1.3 Details of the supplier of the safety data sheet

Borax Europe Limited
6 St. James's Square
London, SW1Y 4AD
United Kingdom

+44 (0)20 7781 2000

e-mail address of person responsible for this SDS : rtb.sds@riotinto.com

1.4 Emergency telephone number

Telephone number : Rio Tinto Borates

Americas: +1 215 207 0061
Asia Pacific: +65 3158 1074
China: +86 512 8090 3042
General: +44 (0) 1235 239 670
For advice on chemical emergencies, spillages, fires or First Aid.

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SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition : Mono-constituent substance

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Repr. 2, H361d (Unborn child)

Aquatic Acute 1, H400 (M=1)

Aquatic Chronic 2, H411

The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.

See Section 16 for the full text of the H statements declared above.

See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : Suspected of damaging the unborn child.
Very toxic to aquatic life.
Toxic to aquatic life with long lasting effects.

Precautionary statements

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

Prevention : Avoid release to the environment.

Response : IF exposed or concerned: Get medical attention.

Storage : Not applicable.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazardous ingredients : Hexaboron dizinc undecaoxide, hydrate

Supplemental label elements : Not applicable.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Not applicable.

Special packaging requirements

Containers to be fitted with child-resistant fastenings : Not applicable.

Tactile warning of danger : Not applicable.

2.3 Other hazards

Product meets the criteria for PBT or vPvB according to Regulation (EC) No. 1907/2006, Annex XIII :

PBT	P	B	T	vPvB	vP	vB
Not applicable (Inorganic)	N/A	N/A	N/A	Not applicable (Inorganic)	N/A	N/A

Other hazards which do not result in classification : None known.

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SECTION 3: Composition/information on ingredients

3.1 Substances : Mono-constituent substance

Product/ingredient name	Identifiers	%	Regulation (EC) No. 1272/2008 [CLP]	Type
Hexaboron dizinc undecaoxide, hydrate	REACH #: 01-2119691658-19 EC: 235-804-2 CAS: 138265-88-0	>98.8	Repr. 2, H361d (Unborn child) Aquatic Acute 1, H400 (M=1) Aquatic Chronic 2, H411 See Section 16 for the full text of the H statements declared above.	[A]

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

Type

[A] Constituent

[B] Impurity

[C] Stabilising additive

Occupational exposure limits, if available, are listed in Section 8.

SECTION 4: First aid measures

4.1 Description of first aid measures

- Eye contact** : Use eye wash fountain or fresh water to cleanse the eye. If irritation persists for more than 30 minutes, seek medical attention.
- Inhalation** : If symptoms such as nose or throat irritation are observed, remove to fresh air.
- 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.
- Protection of first-aiders** : No special protective clothing is required

4.2 Most important symptoms and effects, both acute and delayed

Over-exposure signs/symptoms

- Eye contact** : No known significant effects or critical hazards.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : 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.
- Ingestion** : 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.

4.3 Indication of any immediate medical attention and special treatment needed

- Notes to physician** : 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.

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SECTION 4: First aid measures

Specific treatments : No specific treatment.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture : None. The product is not flammable, combustible or explosive.

Hazardous combustion products : None.

5.3 Advice for firefighters

Special protective actions for fire-fighters : None.

Special protective equipment for fire-fighters : Not applicable.

Additional information : Not explosive.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Eye goggles and gloves are not required for normal industrial exposures, but eye protection according to CEN 166:2001, Respirators (CEN 149:2001) should be considered if environment is excessively dusty.

For emergency responders : Eye goggles and gloves are not required for normal industrial exposures, but eye protection according to CEN 166:2001, Respirators (CEN 149:2001) should be considered if environment is excessively dusty.

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

Small spill : Move containers from spill area. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

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SECTION 6: Accidental release measures

- 6.4 Reference to other sections** : See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

7.1 Precautions for safe handling

- Protective measures** : Good housekeeping procedures should be followed to minimise dust generation and accumulation. Avoid spills.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

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 temperature

Storage pressure: Ambient pressure

Special sensitivity: Moisture (Caking)

Danger criteria

Category	Notification and MAPP threshold	Safety report threshold
E1	100	200

7.3 Specific end use(s)

- Recommendations** : Refer to Annex - Exposure Scenarios
- Industrial sector specific solutions** : Not available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

No exposure limit value known.

- Recommended monitoring procedures** : In the absence of a national OEL, Rio Tinto Borates recommends and applies internally an Occupational Exposure Limit (OEL) of 1 mg B/m³. To convert this product to equivalent zinc (Zn), multiply by 0.301. To convert to equivalent boron (B), multiply by 0.149.

DNELs/DMELs

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SECTION 8: Exposure controls/personal protection

Product/ingredient name	Type	Exposure	Value	Population	Effects
Hexaboron dizinc undecaoxide, hydrate	DNEL	Long term Oral	2.8 mg/kg bw/day	General population [Consumers]	Systemic
	DNEL	Long term Inhalation	9.5 mg/m ³	General population [Consumers]	Systemic
	DNEL	Long term Dermal	1379 mg/kg bw/day	General population [Consumers]	Systemic
	DNEL	Long term Dermal	1814 mg/kg bw/day	Workers	Systemic
	DNEL	Long term Inhalation	25.7 mg/m ³	Workers	Systemic

PNECs

Product/ingredient name	Compartment Detail	Value	Method Detail
zinc	Fresh water	20.6 µg/l	-
	Marine water	6.1 µg/l	-
	Soil	107 mg/kg dwt	-
	Fresh water sediment	117.8 mg/kg dwt	-
	Marine water sediment	56.5 mg/kg dwt	-
	Sewage Treatment Plant	100 µg/l	-
boron	Fresh water	2900 µg/l	-
	Marine water	2900 µg/l	-
	Water - intermittent	13700 µg/l	-
	Soil	5.7 mg B/kg dry soil	-
	Sewage Treatment Plant	10 mg B/L	-

8.2 Exposure controls

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields. Eye protection according to CEN 166:2001 may be warranted if environment is excessively dusty

Skin protection

Hand protection : Standard work gloves (cotton, canvas or leather) may be warranted if environment is excessively dusty

Body protection : No special protective clothing is required.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

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SECTION 8: Exposure controls/personal protection

- Respiratory protection** : Where airborne concentrations are expected to exceed exposure limits, respirators should be used. (CEN 149:2001).
- 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 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

- Physical state** : Solid. [Crystalline solid.]
- Colour** : White.
- Odour** : Odourless.
- Odour threshold** : Not available.
- pH** : 6.8 to 7.5 (Aqueous solution)
- Melting point/freezing point** : >300°C
- Initial boiling point and boiling range** : Not applicable.
- Flash point** : Not applicable.
- Evaporation rate** : Not applicable.
- Flammability (solid, gas)** : The product is not flammable, combustible or explosive.
- Upper/lower flammability or explosive limits** : Not available.
- Vapour pressure** : Not applicable.
- Vapour density** : Not available.
- Bulk density** : Not available.
- Granulometry** : Not available.
- Relative density** : 2.6
- Solubility(ies)** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not applicable.
- Decomposition temperature** : Not applicable.
- Viscosity** : Dynamic (room temperature): Not applicable.
Kinematic (room temperature): Not applicable.
- Explosive properties** : Not explosive.

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SECTION 9: Physical and chemical properties

Oxidising properties : Not oxidising.

9.2 Other information

Solubility in water : <0.28% at 25°C

SECTION 10: Stability and reactivity

10.1 Reactivity : No specific test data related to reactivity available for this product or its ingredients.

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 borates.

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 : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result type	Species	Dose	Exposure
Hexaboron dizinc undecaoxide	LC50 Inhalation	Rat	>5 mg/l	-
	LD50 Dermal	Rabbit	>2000 mg/kg Body weight:	-
	LD50 Oral	Rat	>5000 mg/kg Body weight:	-

Conclusion/Summary : Based on the available data, the classification criteria are not met.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Hexaboron dizinc undecaoxide, hydrate	Skin - No irritation.	Rabbit	-	500 mg	-
	Eyes - No irritation.	Rabbit	<1	100 mg	-

Conclusion/Summary

Skin : Non-irritant to skin. Based on the available data, the classification criteria are not met.

Eyes : Based on mean scores less than 1, the effects were fully reversible within 7 days. Based on the available data, the classification criteria are not met.

Sensitisation

Product/ingredient name	Route of exposure	Species	Result
Hexaboron dizinc undecaoxide, hydrate	skin	Guinea pig	Not sensitizing

Conclusion/Summary

Skin : Not a skin sensitizer. Based on the available data, the classification criteria are not met.

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Respiratory : No respiratory sensitisation studies have been conducted. There are no data to suggest that borates are respiratory sensitisers. Based on the available data, the classification criteria are not met.

Mutagenicity

Product/ingredient name	Test	Experiment	Result
Hexaboron dizinc undecaoxide, hydrate	OECD 476	Experiment: In vitro Subject: Mammalian-Animal Cell: Germ	Negative

Conclusion/Summary : Not mutagenic. Based on the available data, the classification criteria are not met.

Carcinogenicity

Conclusion/Summary : Zinc borate disassociates to zinc hydroxide and boric acid in the low pH environment of the stomach. No carcinogenic effects observed in chronic carcinogenicity studies of boric acid conducted in rats and mice, and no evidence of carcinogenic effects in zinc borate breakdown products. Based on the available data, the classification criteria are not met.

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility effects	Developmental effects	Species	Effects	Exposure
Hexaboron dizinc undecaoxide, hydrate	-	Positive	-	Rat	NOAEL in rats for effects on fertility in males is 100 mg zinc borate (hydrate)/kg/bw. NOAEL in rats for developmental effects on the foetus including foetal weight loss and minor skeletal variations is < 100 mg zinc borate hydrate/kg bw. 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. 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.	Oral feeding study
	Positive	-	Positive	Rat		Oral feeding study
	Negative	Negative	Negative	Human		Combined oral ingestion and inhalation.

Conclusion/Summary : Developmental effects have been observed in laboratory animals, the most sensitive species being the rat (NOAEL 9.6 mg B/kg bw/day). 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. However, the low toxicity of zinc borate (acute oral LD50 is > 10,000 mg/kg) compared to other borates indicates that the bioavailability of boron from zinc borate may be low.

Teratogenicity

Conclusion/Summary : See Reproductive toxicity.

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SECTION 11: Toxicological information

Specific target organ toxicity (single exposure)

Product/ingredient name	Category	Route of exposure	Target organs
Based on the available data, the classification criteria are not met.			

Specific target organ toxicity (repeated exposure)

Product/ingredient name	Category	Route of exposure	Target organs
Based on the available data, the classification criteria are not met.			

Aspiration hazard

Product/ingredient name	Result
Hexaboron dizinc undecaoxide, hydrate	Physical form of solid powder indicates no aspiration hazard potential.

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.**

Potential acute health effects

- Eye contact** : No known significant effects or critical hazards.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : 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.
- Ingestion** : This product is not intended for ingestion. Small amounts (e.g., a teaspoon) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms. 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.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : No known significant effects or critical hazards.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : 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.
- Ingestion** : 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

Short term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

Long term exposure

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SECTION 11: Toxicological information

- Potential immediate effects** : Not available.
- Potential delayed effects** : 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.
- Potential chronic health effects**
- Conclusion/Summary** : 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.
- General** : No known significant effects or critical hazards.
- Carcinogenicity** : No known significant effects or critical hazards.
- Mutagenicity** : No known significant effects or critical hazards.
- Teratogenicity** : Suspected of damaging the unborn child.
- Developmental effects** : Suspected of damaging the unborn child.
- Fertility effects** : No known significant effects or critical hazards.
- Absorption** : Following a single oral dose (1000 mg/kg) of zinc borate (hydrate), zinc and boron appeared in rat plasma and tissue samples, indicating the hydrolysis of zinc borate in the gastrointestinal tract and subsequent systemic absorption of zinc and boron.
- Distribution** : In plasma, T_{max} occurred between 5 and 6 h after administration. Concentrations decreased to background levels by 72 h post-dose; T_{1/2} ranged from 5.0 to 7.7 h (zinc and boron, respectively).
- Elimination** : The gastrointestinal route was the primary elimination route for zinc, while urinary excretion via the kidneys was the primary elimination route for boron.
- Other information** : Not available.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Test	Result	Species	Exposure
zinc	Invertebrate	EC50 0.147 mg/l (as Zn)	<i>Ceriodaphnia dubia</i>	Fresh water - Acute
	Fish.	LC50 0.169 mg/l (as Zn)	<i>Oncorhynchus mykiss</i>	Fresh water - Acute
	Algae	LC50 0.136 mg/l (as Zn)	<i>Pseudokirchneriella subcapitata</i>	Fresh water - Acute
	Invertebrate	NOEC 0.037 mg/l (as Zn)	<i>Ceriodaphnia dubia</i>	Fresh water - Chronic
	Fish.	NOEC 0.044 mg/l (as Zn)	<i>Jordanella floridae</i>	Fresh water - Chronic
	Algae	NOEC 0.019 mg/l (as Zn)	<i>Pseudokirchneriella subcapitata</i>	Fresh water - Chronic
boron	Algae	EC50 52.4 mg/l (as Boron)	<i>Pseudokirchneriella subcapitata</i>	Fresh water - Acute
	Invertebrate	LC50 91 mg/l (as Boron)	<i>Ceriodaphnia dubia</i>	Fresh water - Acute
	Fish.	LC50 79.7 mg/l (as Boron)	<i>Pimephales promelas</i>	Fresh water - Acute
	Fish.	NOEC 6.4 mg/l (as Boron)	<i>Brachydanio rerio</i>	Fresh water - Chronic
	Invertebrate	NOEC 14.2 mg/l (as Boron)	<i>Daphnia magna</i>	Fresh water - Chronic
	Algae	NOEC 17.5 mg/l (as Boron)	<i>Pseudokirchneriella subcapitata</i>	Fresh water - Chronic

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SECTION 12: Ecological information

Conclusion/Summary : Note that the data 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.

A study of the transformation/dissolution characteristics of zinc borate was conducted following the OECD 29 protocol. The amount of zinc ion in solution after 24 hr exceeded the acute reference values, so zinc borate is classified as Aquatic Acute 1 (H400: Very toxic to aquatic life). The amount of zinc in solution after 28 days also exceeded the chronic reference values. However, because over 70% of zinc ions were removed from the water column within 28 days (demonstrating "rapid partitioning") and zinc is not considered bioaccumulative, the Chronic 1 category does not apply.

Boron is an essential micronutrient for healthy growth of plants; however, it can be harmful to boron sensitive plants in high quantities. Care should be taken to minimize the amount of this product released to the environment.

12.2 Persistence and degradability

Conclusion/Summary : Not applicable. Inorganic substance

12.3 Bioaccumulative potential

Not available.

12.4 Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Mobility : Zinc borate will hydrolyze under environmental conditions to boric acid and zinc hydroxide. Adsorption of boric acid to soils or sediments is minimal. Adsorption of zinc ions is described by partition coefficients and may vary with site-specific conditions. For boric acid, the solids-water partitioning coefficients are 2.19 L/kg (soil) and 2.8 L/kg (sediment). For zinc, the solids-water partitioning coefficients are 159 L/kg (soil), 73,000 L/kg (freshwater/sediment), and 6010 L/kg (seawater/sediment).

12.5 Results of PBT and vPvB assessment

Product/ingredient name	PBT	P	B	T	vPvB	vP	vB
Hexaboron dizinc undecaoxide, hydrate	Not applicable (Inorganic)	N/A	N/A	N/A	Not applicable (Inorganic)	N/A	N/A

12.6 Other adverse effects : No known significant effects or critical hazards.

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

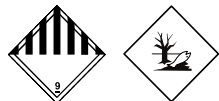
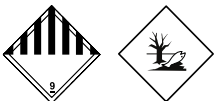
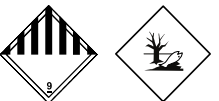
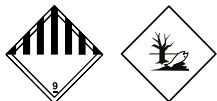
Methods of disposal : Tonnage quantities of product should, if possible, be used for an appropriate application. Final disposal must be to a registered landfill site following the guidance of appropriate local authorities. Zinc borate has a reportable quantity (RQ) of 454 kg (1000 lbs).

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SECTION 13: Disposal considerations

- Hazardous waste** : Yes. This product 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 (H10 and H14, respectively).
- Packaging**
- Methods of disposal** : The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.
- Special precautions** : Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

SECTION 14: Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN number	UN3077	UN3077	UN3077	UN3077
14.2 UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Hexaboron dizinc undecaoxide, hydrate)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Hexaboron dizinc undecaoxide, hydrate)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Hexaboron dizinc undecaoxide, hydrate)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Hexaboron dizinc undecaoxide, hydrate)
14.3 Transport hazard class(es)	9 	9 	9 	9 
14.4 Packing group	III	III	III	III
14.5 Environmental hazards	Yes.	Yes.	Yes.	Yes.

Additional information

- ADR/RID** : This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.
- ADN** : This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.
- IMDG** : This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.
- IATA** : This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.

14.6 Special precautions for user : Not applicable.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code : Not available.

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SECTION 15: Regulatory information

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

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Annex XIV

None of the components are listed.

Substances of very high concern

None of the components are listed.

Annex XVII - Restrictions : Not applicable.
**on the manufacture,
placing on the market
and use of certain
dangerous substances,
mixtures and articles**

Other EU regulations

Industrial emissions : Not listed
**(integrated pollution
prevention and control) -
Air**

Industrial emissions : Not listed
**(integrated pollution
prevention and control) -
Water**

Ozone depleting substances (1005/2009/EU)

Not listed.

Prior Informed Consent (PIC) (649/2012/EU)

Not listed.

Seveso Directive

This product is controlled under the Seveso Directive.

Danger criteria

Category
E1

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : All components are listed or exempted.

Canada : All components are listed or exempted.

China : All components are listed or exempted.

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SECTION 15: Regulatory information

Europe	: All components are listed or exempted.
Japan	: Japan inventory (ENCS): All components are listed or exempted. Japan inventory (ISHL): Not determined.
New Zealand	: All components are listed or exempted.
Philippines	: Not determined.
Republic of Korea	: All components are listed or exempted.
Taiwan	: All components are listed or exempted.
Thailand	: Not determined.
Turkey	: Not determined.
United States	: All components are listed or exempted.
Viet Nam	: Not determined.

15.2 Chemical safety assessment : Complete.

SECTION 16: Other information

✔ Indicates information that has changed from previously issued version.

Abbreviations and acronyms : ATE = Acute Toxicity Estimate
 CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
 DMEL = Derived Minimal Effect Level
 DNEL = Derived No Effect Level
 EUH statement = CLP-specific Hazard statement
 N/A = Not available
 PBT = Persistent, Bioaccumulative and Toxic
 PNEC = Predicted No Effect Concentration
 RRN = REACH Registration Number
 SGG = Segregation Group
 vPvB = Very Persistent and Very Bioaccumulative

Key literature references and sources for data : For general information on the toxicology of borates see Patty's Toxicology, 6th Edition Vol. I, (2012) Chap. 23, 'Boron'.

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Repr. 2, H361d (Unborn child) Aquatic Acute 1, H400 (M=1) Aquatic Chronic 2, H411	Expert judgment Expert judgment Expert judgment

Full text of abbreviated H statements

H361d H400 H411	Suspected of damaging the unborn child. Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.
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Full text of classifications [CLP/GHS]

Aquatic Acute 1, H400 Aquatic Chronic 2, H411 Repr. 2, H361d	SHORT-TERM (ACUTE) AQUATIC HAZARD - Category 1 LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 2 REPRODUCTIVE TOXICITY (Unborn child) - Category 2
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Additional information : Do not ingest.
 Keep out of reach of children.
 Refer to safety data sheet.
 Not for use in food, drugs or biocides

Date of issue/ Date of revision : 14/11/2019

Firebrake® ZB

SECTION 16: Other information

Date of previous issue : 03/07/2018

Version : 1

Europe / 4.10.2 / EN-GB

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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	Identified Use	Setting (industrial/professional worker/consumer)	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process Category (PROC)	Article Category (AC)	Environmental release category (ERC)	Exposure Scenario Title
			Manufacture	Formulation	End Use	Consumer	Service Life (for articles)						
1	Manufacture of zinc borate	Industrial	X					8	0 (flame retardant), 12, 19, 21	1, 2, 3, 8a, 8b, 15	-	1	ES1 Manufacture of zinc borate
2	Formulation of zinc borate into mixtures or materials	Industrial and professional			X			3, 6, 8, 10, 11, 12, 13, 14, 16, 19, 22	1, 9a, 32	1, 2, 3, 4, 5, 6, 8a, 8b, 9, 12, 14, 21, 24	1, 2, 4, 7, 8, 10, 11, 13	2, 3	ES2 Formulation of zinc borate into mixtures or materials
3	Industrial use of zinc borate formulations containing zinc borate	Industrial and professional				X		3, 10, 19, 21, 22	1, 9a, 32	5, 7, 8a, 10, 11, 13, 19	1, 2, 4, 7, 8, 11, 13	4, 5, 6, 7	ES3 Industrial use of zinc borate formulations containing zinc borate
4	Use of fertilizers containing zinc borate	Professional			X			1, 22	12	5, 8b	-	8e, 8f	ES4 Use of fertilizers containing zinc borate
5	Zinc borate in plastics during service life	Consumer				X		-	-	-	-	10, 11a	ES5 Zinc borate in plastics during service life
6	Use of zinc borate in lubricants in cars	Consumer				X		-	-	-	-	9b	ES6 Use of zinc borate in lubricants in cars
7	Consumer use of formulated products and materials containing zinc borate	Consumer				X		-	1, 9a, 32	-	1, 2, 4, 7, 8, 11, 13	6	ES7 Consumer use of formulated products and materials containing zinc borate