

SAFETY DATA SHEET



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

1.1 Product identifier

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

| Registration number | Legal entity |
|-----------------------|------------------------------------|
| 01-2119691658-19-0004 | 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 |
|---|
| Fertilisers <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
T: +44 (0)20 7781 2000

Rio Tinto Iron & Titanium GmbH
Alfred-Herrhausen-Allee 3-5,
65760 Eschborn
Germany
T: +49 6196 96000

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

National contact

Not applicable.

1.4 Emergency telephone number

Telephone number : +44 (0) 1235 239 670 (Rio Tinto Borates)
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

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 advice/attention.

Storage : Not applicable.

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

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 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 applicable. Odourless.
- pH** : 6.8 to 7.5 (Aqueous solution)
- Melting point/freezing point** : >300°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 (solid, gas)** : The product is not flammable, combustible or explosive.
- 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
- Bulk density** : not available. Depends on batch.
- Granulometry** : not available. Depends on batch.
- Relative density** : 2.6
- Solubility(ies)** : <0.28% at 25°C
- Partition coefficient: n-octanol/water** : Not applicable. Inorganic substance.
- Auto-ignition temperature** : Not applicable. Not self-heating.
- Decomposition temperature** : Not applicable. Melting point >300°C
- Viscosity** : Dynamic (room temperature): Not applicable. solid substance
Kinematic (room temperature): Not applicable. solid substance
- 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, hydrate | LC50 Inhalation | Rat | >5 mg/l | 4 hours |
| | 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

Zincubor®

SECTION 11: Toxicological information

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

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.

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SECTION 11: Toxicological information

Teratogenicity

Conclusion/Summary : See Reproductive toxicity.

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.

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SECTION 11: Toxicological information

- Potential delayed effects** : Not available.
- Long term exposure**
- 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.
- Reproductive toxicity** : Suspected of damaging the unborn child.
- 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

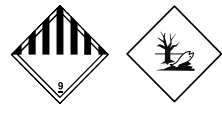
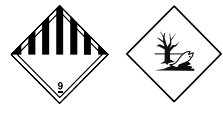


Methods of disposal : Tonnage quantities of product should, if possible, be used for an appropriate application. Final disposal must be to a registered landfill site following the guidance of appropriate local authorities. Zinc borate has a reportable quantity (RQ) of 454 kg (1000 lbs).

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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 IMO instruments : 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

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 | : All components are listed or exempted. |
| Republic of Korea | : All components are listed or exempted. |
| Taiwan | : All components are listed or exempted. |
| Thailand | : Not determined. |
| Turkey | : All components are listed or exempted. |
| United States | : All components are active or exempted. |
| Viet Nam | : All components are listed or exempted. |

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 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. |
|-----------------------|--|

Full text of classifications [CLP/GHS]

| | |
|---|---|
| Aquatic Acute 1 Aquatic Chronic 2 Repr. 2 | SHORT-TERM (ACUTE) AQUATIC HAZARD - Category 1 LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 2 REPRODUCTIVE TOXICITY - Category 2 |
|---|---|

Additional information :

- Restricted to professional users.
- Do not ingest.
- Keep out of reach of children.
- Refer to safety data sheet.
- Not for use in drugs, biocides or for food preservation
- Use only as directed.

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SECTION 16: Other information

Date of issue/ Date of revision : 17/12/2020

Date of previous issue : 14/11/2019

Version : 1

Europe / 4.11 / 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 | 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) | | | | | | Manufacture | Formulation |
| 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 |
|----|-------------|-----------------------------|--|--|--|---|--|----|----|---|---|----------------|--|---|

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.