SAFETY DATA SHEET

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

1.1 Product identifier

Product name : ***Solubor*® DF**

UFI : NXR2-40WF-V009-A61E

Product type : Solid.

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
Importing and packaging Agriculture (Fertilisers) *A complete list of uses is provided in the introduction to Annex - Exposure Scenarios*

Uses advised against	Reason
Consumer uses.	Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

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

Borax Francais S.A.S.
Usine/Siège Social
Route de Bourbourg
59411 Coudekerque-Branche
Cedex, France
T: +33 3 28 29 28 30

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

1.4 Emergency telephone number

National advisory body/Poison Centre

Telephone number : Not available.

Telephone number : +44 (0) 1235 239 670 (Rio Tinto Borates)
For advice on chemical emergencies, spillages, fires or First Aid.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition : Mixture

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

Eye Irrit. 2, H319
Repr. 1B, H360FD

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 : Danger

Hazard statements : Causes serious eye irritation.
May damage fertility. May damage the unborn child.

Precautionary statements

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

Prevention : Wear eye protection.

Response : IF exposed or concerned: Get medical advice/attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage : Not applicable.

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

Supplemental label elements : Not applicable.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Restricted to professional users.

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 : This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

Product meets the criteria for endocrine disrupting properties according to Regulation (EC) No. 1907/2006. : Not applicable. Based on the available data, the classification criteria are not met.

Other hazards which do not result in classification : May be harmful if swallowed.

SECTION 3: Composition/information on ingredients

3.2 Mixtures : Mixture

Product/ingredient name	Identifiers	%	Classification	Specific Conc. Limits, M-factors and ATEs	Type
boric acid	REACH #: 01-2119486683-25 EC: 233-139-2 CAS: 10043-35-3 Index: 005-007-00-2	≥25 - ≤50	Repr. 1B, H360FD	-	[1] [2]
disodium tetraborate pentahydrate	REACH #: 01-2119490790-32 EC: 215-540-4 CAS: 12179-04-3 Index: 005-011-02-9	≥25 - ≤50	Eye Irrit. 2, H319 Repr. 1B, H360FD	-	[1] [2]
Pentaboron sodium octaoxide pentahydrate	REACH #: 01-2119970731-35 EC: 234-522-7 CAS: 12631-71-9	≥10 - ≤25	Repr. 2, H361d **See Section 16 for the full text of the H statements declared above.**	-	[1]

Type

[1] Substance classified with a health or environmental hazard
[2] Substance with carcinogenic, mutagenic or reproductive toxicity properties

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment, are PBTs, vPvBs or Substances of equivalent concern, or have been assigned a workplace exposure limit and hence require reporting in this section.

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 : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

SECTION 4: First aid measures

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.

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 protection according to CEN 166:2001; respirators according to CEN149:2001 should be considered if environment is excessively dusty.

For emergency responders : Eye protection according to CEN 166:2001; respirators according to CEN149:2001 should be considered if environment is excessively dusty.

SECTION 6: Accidental release measures

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.

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)

7.3 Specific end use(s)

Recommendations : Refer to Annex - Exposure Scenarios

Industrial sector specific solutions : Not available.

SECTION 8: Exposure controls/personal protection

The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

8.1 Control parameters

Occupational exposure limits

Product/ingredient name	Exposure limit values
boric acid	**Regulation on the protection of workers from the risks related to exposure to carcinogens, mutagens or reprotoxic substances at work (OEL) (Slovenia, 4/2025)** Repr Fer 1B, Repr Dev 1B. Peak 15 minutes: 1 mg/m³ 4 times per shift [time between two exposure events at this concentration must be at least 60 minutes]. Form: Inhalable fraction. TWA 8 hours: 0.5 mg/m³. Form: Inhalable fraction.
disodium tetraborate pentahydrate	**ACGIH TLV (United States, 1/2025) [Borate compounds, Inorganic]** A4. TWA 8 hours: 2 mg/m³. Form: Inhalable fraction. STEL 15 minutes: 6 mg/m³. Form: Inhalable fraction.

Biological exposure indices

No exposure indices 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 product into equivalent boron (B) content, multiply by 0.167.

DNELs/DMELs

Product/ingredient name	Result
Solubor® DF	**DNEL - General population - Consumers - Long term - Oral** 1.02 mg/kg bw/day Effects: Systemic **DNEL - General population - Consumers - Short term - Oral** 1.02 mg/kg bw/day Effects: Systemic **DNEL - General population - Consumers - Short term - Inhalation** 15.09 mg/m³ Effects: Local **DNEL - General population - Consumers - Long term - Inhalation** 15.09 mg/m³ Effects: Local **DNEL - Workers - Long term - Inhalation** 15.09 mg/m³ Effects: Local **DNEL - Workers - Short term - Inhalation** 15.09 mg/m³ Effects: Local **DNEL - Workers - Long term - Inhalation** 8.68 mg/m³ Effects: Systemic **DNEL - General population - Consumers - Long term - Inhalation** 4.37 mg/m³

SECTION 8: Exposure controls/personal protection

Effects: Systemic

DNEL - General population - Consumers - Long term - Dermal
205.4 mg/kg bw/day
Effects: Systemic

DNEL - Workers - Long term - Dermal
407.2 mg/kg bw/day
Effects: Systemic

PNECs

Product/ingredient name	Result
Solubor® DF	**Fresh water** 2.02 mg B/L **Marine water** 2.02 mg B/L **Water - intermittent** 13.7 mg B/L **Air** 0 No exposure expected **Soil** 5.4 mg B/kg dry soil **Sediment** 0 Waived due to lack of partitioning to sediment **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: chemical splash goggles. Recommended: Eye protection according to CEN 166:2001 is required.

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.

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 an hazardous waste and removed by licensed operator to an offsite location where it can be incinerated or disposed to a hazardous landfill.

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

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

SECTION 9: Physical and chemical properties

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

9.1 Information on basic physical and chemical properties

Appearance

Physical state : Solid. [Crystalline solid.]

Colour : White.

Odour : Odourless.

Odour threshold : Not applicable. Odourless.

Melting point/freezing point : >500°C

Boiling point or initial boiling point and boiling range : Not applicable. [melting point >300°C]

Flammability : Non-flammable. The product is not flammable, combustible or explosive.

Lower and upper explosion limit : Not applicable. Non-flammable.

Flash point : Not applicable. inorganic mixture

Auto-ignition temperature : Not applicable (solid). [Not self-heating.]

Decomposition temperature : Not applicable. Melting point>300°C

pH : 7.4 [Conc. (% w/w): 10%]

Viscosity : Dynamic (room temperature): Not applicable (not liquid). [solid substance]
Kinematic (room temperature): Not applicable (not liquid). [solid substance]
Kinematic (40°C): Not available.

Solubility in water : 9.5% at 20 °C

Partition coefficient n-octanol/water (log Pow) : There are no data available on the mixture itself. [inorganic mixture]

Vapour pressure : Not applicable. Melting point>300°C

Relative density : 1.49 @ 23°C (Boric acid); 2.35 @ 26°C (Disodium tetraborate anhydrous); 1.72 @ 23°C (Disodium tetraborate decahydrate); 1.691 @ 20°C (Pentaboron sodium octaoxide pentahydrate)

Density : 1.87 g/cm³ [22°C (71.6°F)]

Bulk density : Not available. Depends on batch.

Granulometry : Not available. Depends on batch.

SECTION 9: Physical and chemical properties

Relative vapour density : Not applicable. Melting point>300°C

Particle characteristics

Median particle size : Not available.

9.2 Other information

9.2.1 Information with regard to physical hazard classes

Explosive properties : Not explosive.

Oxidising properties : Not oxidising.

9.2.2 Other safety characteristics

Evaporation rate : Not applicable (solid). [Non-volatile.]

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 ambient temperatures, 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 hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity

Product/ingredient name	Result
boric acid	**Rat - Oral - LD50** 2000 to 5000 mg/kg OECD 401 Toxic effects: Low acute oral toxicity. The oral LD_{50} value in male rats is 3450 mg/kg body weight, and in female rats is 4080 mg/kg body weight. Based on the available data, the classification criteria are not met. **Rabbit - Dermal - LD50** >2000 mg/kg EPA [FIFRA Guidelines] Toxic effects: Low acute dermal toxicity LD_{50} 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. **Rat - Inhalation - LC50 Dusts and mists** >2 mg/l [4 hours] OECD 403 Toxic effects: Low acute inhalation toxicity. LC_{50} in rats is >2.0 mg/L or (g/m^3). Based on the available data, the classification criteria are not met.

SECTION 11: Toxicological information

disodium tetraborate pentahydrate	**Rat - Oral - LD50** 3305 mg/kg EPA [FIFRA Guidelines] Toxic effects: Small amounts (e.g. a teaspoonful) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms. **Rabbit - Dermal - LD50** >2000 mg/kg EPA [FIFRA Guidelines] Toxic effects: Poorly absorbed through intact skin. **Rat - Inhalation - LC50 Dusts and mists** >2 mg/l [4 days] OECD 403 [Acute Inhalation Toxicity] Toxic effects: Low acute inhalation toxicity. LC_{50} in rats is > 2.0 mg/l (or g/m^3).Based on the available data, the classification criteria are not met.
Pentaboron sodium octaoxide pentahydrate	**Rat - Male - Oral - LD50** 3200 to 3400 mg/kg **Rabbit - Dermal - LD50** >2000 mg/kg **Rat - Inhalation - LC50 Vapour** 2.12 mg/l [4 hours]

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

Acute toxicity estimates

N/A

Skin corrosion/irritation

Product/ingredient name	Result
boric acid	**New Zealand White Rabbit - Skin - Primary dermal irritation index (PDII)** Amount/concentration applied: 0.5 g moistened with saline Irritation score: 0.1
disodium tetraborate pentahydrate	**New Zealand White Rabbit - Skin - No irritation.** EPA Amount/concentration applied: 0.5 g moistened with saline
Pentaboron sodium octaoxide pentahydrate	**New Zealand White Rabbit - Skin - No irritation.** Amount/concentration applied: 0.5 g moistened with saline (Disodium tetraborate pentahydrate)

Conclusion/Summary [Product] : Non-irritant to skin.

Ingredient name	Conclusion/Summary
boric acid	Non-irritant to skin. Mean primary irritation score: 0.1. Based on available data, the classification criteria are not met.
disodium tetraborate pentahydrate	Non-irritant to skin.

Serious eye damage/eye irritation

Product/ingredient name	Result

SECTION 11: Toxicological information

boric acid	**New Zealand White Rabbit - Eyes - Cornea opacity** OECD 405 Amount/concentration applied: 0.1 g Irritation score: <1 Fully reversible in 7 days or less
disodium tetraborate pentahydrate	**New Zealand White Rabbit - Eyes - Irritant** OECD 405 Amount/concentration applied: 0.08 ml equivalent Fully reversible in more than 7 days
Pentaboron sodium octaoxide pentahydrate	**New Zealand White Rabbit - Eyes - No irritation.** Amount/concentration applied: 0.1 g Sodium Pentaborate Irritation score: <1 Fully reversible

Conclusion/Summary [Product] : Irritating, fully reversible in 14 days. Classification: Eye irritation Category 2 (Hazard statements: H319 Causes serious eye irritation.)
Many years of occupational exposure indicate no adverse effects on human eye.

Respiratory corrosion/irritation

Not available.

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

Respiratory or skin sensitization

Product/ingredient name	Result
boric acid	**Guinea pig - Respiratory** OECD 406 [Buhler Test- 0.4 g, 95% w/w/boric acid] Not sensitizing **Guinea pig - skin** OECD 406 [Buhler Test-0.4 g, 95% w/w/boric acid] Not sensitizing
disodium tetraborate pentahydrate	**Guinea pig - skin** OECD 406 Not sensitizing

Skin

Conclusion/Summary [Product] : Non-sensitiser to skin. Based on the available data, the classification criteria are not met.

Respiratory

Conclusion/Summary [Product] : No respiratory sensitisation studies have been conducted. There are no data to suggest that boric acid is a respiratory sensitiser. Based on the available data, the classification criteria are not met.

Germ cell mutagenicity

Product/ingredient name	Result

SECTION 11: Toxicological information

boric acid	**In vitro - Mammalian-Animal - Germ** (based on boric acid) 100 to 10000 ppm Result: Negative
disodium tetraborate pentahydrate	**In vitro - Mammalian-Animal - Germ** (based on boric acid) 1000 to 10000 ppm Result: Negative

Conclusion/Summary [Product] : Not mutagenic (based on boric acid). Based on the available data, the classification criteria are not met.

Carcinogenicity

Product/ingredient name	Result
boric acid	**Mouse - Oral - TC** OECD 451 [Oral feeding study] 446 to 1150 mg/kg Result: Negative
disodium tetraborate pentahydrate	**Rat - Oral - NOEL** OECD 451 equivalent [Oral feeding study (based on boric acid)] 446 to 1150 mg/kg Result: Negative

Conclusion/Summary [Product] : No evidence of carcinogenicity in mice. Based on the available data, the classification criteria are not met.

Reproductive toxicity

Product/ingredient name	Result
boric acid	**Rat - Oral** Prenatal Developmental Toxicity Study of Boric Acid ; Oral feeding study Effects: NOAEL in rats for developmental effects on the foetus including foetal weight loss and minor skeletal variations is 9.6 mg B/kg body weight; NOAEL in rats for maternal toxicity is 13.3 mg B/kg body weight Maternal toxicity: Positive Developmental: Positive **Human - Inhalation** Effects: 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. Maternal toxicity: Negative Fertility effects: Negative Developmental: Negative **Rat - Oral** Three-generation feeding study. Two-Generation Reproduction Toxicity Study Effects: NOAEL in rats for effects on fertility in males is 17.5 mg B/kg body weight. Fertility effects: Positive
disodium tetraborate pentahydrate	**Rat - Oral**

SECTION 11: Toxicological information

OECD 416 [Three-generation feeding study. Two-Generation Reproduction Toxicity Study]
Effects: NOAEL in rats for effects on fertility in males is 17.5 mg B/kg body weight.
Fertility effects: Positive

Human - Inhalation
Effects: 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.
Maternal toxicity: Negative
Fertility effects: Negative
Developmental: Negative

Rat - Oral
Prenatal Developmental Toxicity Study
Effects: NOAEL in rats for developmental effects on the foetus including foetal weight loss and minor skeletal variations is 9.6 mg B/kg body weight; NOAEL in rats for maternal toxicity is 13.3 mg B/kg body weight
Maternal toxicity: Positive
Developmental: Positive

Conclusion/Summary [Product] : Reprotoxicity studies have been conducted with boric acid and disodium tetraborate. 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. Boric acid and Disodium tetraborate are 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.

Specific target organ toxicity (single exposure)

Product/ingredient name	Result
Based on the available data, the classification criteria are not met.	

Specific target organ toxicity (repeated exposure)

Product/ingredient name	Result
Based on the available data, the classification criteria are not met.	

Aspiration hazard

Product/ingredient name	Result
Solubor ® DF	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 : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

SECTION 11: Toxicological information

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 : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

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

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

Product/ingredient name	Result
boric acid	**Chronic - Rat - Oral - NOAEL** OECD [Chronic Toxicity Studies] 17.5 mg/kg
disodium tetraborate pentahydrate	**Chronic - Rat - Oral - NOAEL** OECD 452 [Chronic toxicity study of boric acid and disodium tetraborate decahydrate, similar to OECD 452.] 17.5 mg/kg Toxic effects: 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 (renal, hematopoietic

SECTION 11: Toxicological information

systems) are only observed at even higher doses.

Conclusion/Summary [Product] : A NOAEL of 17.5 mg B/kg body weight/day equivalent to 100 mg boric acid/ kg body weight/day was determined in a chronic feeding study (2 years) in rats and is based on testes 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.

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 : May damage fertility. May damage the unborn child.

Toxicokinetics

Absorption : 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 %.

Distribution : Boric acid is distributed rapidly and evenly through the body, with concentrations in bone 2 - 3 higher than in other tissues.

Metabolism : In the blood boric acid is the main species present and is not further metabolised

Elimination : 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.

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

Not applicable.

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

11.2.2 Other information

Not available.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result
boric acid	**LC50** Invertebrate *Ceriodaphnia dubia* 91 mg/l - (as Boron) **NOEC** Invertebrate *Daphnia magna* 14.2 mg/l - (as Boron) **NOEC** Fish. *Brachydanio rerio* 6.4 mg/l - (as Boron) **LC50** Fish. *Pimephales promelas*

SECTION 12: Ecological information

	79.7 mg/l - (as Boron) **EC50** Algae *Pseudokirchneriella subcapitata* 52.4 mg/l - (as Boron) **NOEC** Algae *Pseudokirchneriella subcapitata* 17.5 mg/l - (as Boron)
disodium tetraborate pentahydrate	**NOEC** Fish. *Brachydanio rerio* 6.4 mg/l - (as Boron) **LC50** Invertebrate *Ceriodaphnia dubia* 91 mg/l - (as Boron) **LC50** Fish. *Pimephales promelas* 79.7 mg/l - (as Boron) **NOEC** Algae *Pseudokirchneriella subcapitata* 17.5 mg/l - (as Boron) **NOEC** Invertebrate *Daphnia magna* 14.2 mg/l - (as Boron) **EC50** Algae *Pseudokirchneriella subcapitata* 52.4 mg/l - (as Boron)

Conclusion/Summary [Product] : Note that the data values are expressed as boron equivalents. To convert product into equivalent boron (B) content, multiply by 0.167. Studies judged to be unreliable or with insufficient information to evaluate are not included.

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

Not available.

Conclusion/Summary [Product] : Not applicable. Inorganic substance

12.3 Bioaccumulative potential

SECTION 12: Ecological information

Product/ingredient name	$LogP_{ow}$	BCF	Potential
boric acid	-0.757	-	Low
disodium tetraborate pentahydrate	-1.53	-	Low

12.4 Mobility in soil

Soil/water partition coefficient

Product/ingredient name	Value
disodium tetraborate pentahydrate	logKoc: -0.12 Koc: 0.757

Results of PMT and vPvM assessment

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

Conclusion/Summary : The product does not meet the criteria to be considered as a PMT or vPvM.

12.5 Results of PBT and vPvB assessment

Regulation (EC) No. 1907/2006 [REACH]

According to the results of its assessment, this substance is not a PBT or a vPvB.

Regulation (EC) No. 1272/2008 [CLP]

Conclusion/Summary Regulation (EC) No. 1272/2008 [CLP] : The product does not meet the criteria to be considered as a PBT or vPvB.

12.6 Endocrine disrupting properties

Not applicable.

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

12.7 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 : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Hazardous waste : Yes. This product is classified as toxic to reproduction (Repr. 1B) and falls within scope of Directive 2008/98/EC as hazardous waste (H10)

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 or ID number	Not regulated.	Not regulated.	Not regulated.	Not regulated.
14.2 UN proper shipping name	-	-	-	-
14.3 Transport hazard class(es)	-	-	-	-
14.4 Packing group	-	-	-	-
14.5 Environmental hazards	No.	No.	No.	No.

14.6 Special precautions for user : Not applicable.

14.7 Maritime transport in bulk according to IMO instruments : Not available.

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

Intrinsic property	Ingredient name	Status	Reference number	Date of revision
Toxic to reproduction	Boric acid Disodium tetraborate anhydrous	Recommended Candidate	ED/69/2013 ED/69/2013	7/1/2015 7/1/2015

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Product/ingredient name	%	Designation [Usage]
Boric acid Disodium tetraborate pentahydrate	≥25 - ≤50 ≥25 - ≤50	30 30

Labelling : Restricted to professional users.

Other EU regulations

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

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

Explosive precursors : Not applicable.

SECTION 15: Regulatory information

(EC) No 273/2004 on drug precursors

Not listed.

(EC) No 111/2005 Trade between the Union and third countries in drug precursors

Not listed.

Ozone depleting substances (EU 2024/590)

Not listed.

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

Not listed.

Persistent Organic Pollutants

Not listed.

Seveso Directive

This product is not controlled under the Seveso Directive.

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.
Chile	:	Not determined.
China	:	All components are listed or exempted.
Colombia	:	Not determined.
Eurasian Economic Union	:	**Russian Federation inventory**: All components are listed or exempted.
Japan	:	**Japan inventory (CSCL)**: Not determined. **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	:	Not determined.
United States	:	Not determined.
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
Eye Irrit. 2, H319 Repr. 1B, H360FD	Expert judgment Regulatory data

Full text of abbreviated H statements

H319	Causes serious eye irritation.
H360FD	May damage fertility. May damage the unborn child.
H361d	Suspected of damaging the unborn child.

Full text of classifications [CLP/GHS]

Eye Irrit. 2	SERIOUS EYE DAMAGE/EYE IRRITATION - Category 2
Repr. 1B	REPRODUCTIVE TOXICITY - Category 1B
Repr. 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.

Date of issue/ Date of revision : 04/09/2026

Date of previous issue : 23/11/2022

Version : 1.03

Europe / 4.15 / EN-GB

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SECTION 16: Other information

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