



Sodium Metaborate 4-mol

Section 1 Identification

1.1	Product name	Sodium Metaborate 4-Mol	
1.2	Other means of identification	Sodium metaborate dihydrate	
1.3	Recommended use and restriction on use	Industrial manufacturing	
1.4	Supplier's details (including name, address, phone number, email)	Rio Tinto Minerals Asia Pte Ltd 12 Marina Boulevard #20-01 Marina Bay Financial Centre Tower 3 Singapore 018982 +65 6679 9316 rtb.sds@riotinto.com	Borax Europe Limited 6 St. James's Square London, SW1Y 4AD, United Kingdom +44 20 7781 2000
	Manufacturer	Borax Français S.A.S. Usine/Siège Social Route de Bourbourg CS 70059 59411 Coudekerque-Branche Cedex, France + (33) 3 28 29 28 30	
	Emergency phone number	APAC +65 3158 1074 (24-Hr Non toll-free number) (Rio Tinto Borates) EIMEA +44 (0) 1235 239 670 (Rio Tinto Borates)	

Section 2 Hazards identification

- 2.1 **Classification of the substance or mixture**
 Reproductive Toxicity Category 2
 Serious Eye Damage / Eye Irritation Category 2A
 Acute Toxicity (Oral) Category 5
- 2.2 **GHS label elements, including pictogram or symbol, signal word, hazard and precautionary statements**

Hazard pictogram



Signal word: Warning

Hazard statement:

H361: Suspected of damaging fertility or the unborn child.
 H319: Causes serious eye irritation.
 H303: May be harmful if swallowed.

Precautionary statements:

H202: Do not handle until all safety precautions have been read and understood.

P280: Wear eye protection.

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

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

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

Other hazards which do not result in classification (e.g. dust explosion hazard): None.

Section 3 Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS No.	% content
Sodium metaborate dihydrate	Disodium diborate tetrahydrate	16800-11-6	>99

Section 4 First aid measures

4.1 Description of first aid measures

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

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

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

Skin contact: No treatment necessary.

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

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

4.3 Indication of any immediate medical attention and special treatment needed: Note to physicians: Supportive care only is required for adult ingestion of less than a few grams of the product. For ingestion of large 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. Haemodialysis should be reserved for patients with massive acute ingestion, especially for patients with compromised renal failure. Boron analyses of urine or blood are only useful for verifying exposure and are should not be used to evaluating severity of poisoning or as a guide in treatment¹.

Section 5 Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media: Use extinguishing media that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media: None

5.2 Specific hazards arising from the substance or mixture

None. The product is not flammable, combustible or explosive.

5.3 Special protective equipment and precautions for fire-fighters:

Not applicable. The product is itself a flame retardant.

Section 6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel:

Eye protection according to ANSI Z.87.1 or other national standards. Respirators according to EN149:2001 or other national standards should be considered if environment is excessively dusty.

For emergency responders:

Eye protection according to ANSI Z.87.1 or other national standards. Respirators according to EN149:2001 or other national standards 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 materials for containment and cleaning up

Appropriate containment: Avoid spillage into water and cover drains.

Land spill: Vacuum, shovel or sweep up and place in containers for disposal in accordance with applicable local regulations.

Spillage into water: Where possible, remove any intact containers from the water.

6.4 Reference to other sections

Refer to sections 8, 12 and 13.

Section 7 Handling and storage

7.1 Precautions for safe handling

Good housekeeping procedures should be followed to minimise dust generation and accumulation. Avoid spills. Do not eat, drink and smoke in work areas. Wash hands after use. Remove contaminated clothing and protective equipment before entering eating areas

7.2 Conditions for safe storage (including any incompatibilities)

No special handling precautions are required, but dry, indoor storage is recommended. To maintain package integrity and to minimise caking of the product, bags should be handled on a first-in first-out basis.

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

Section 8 Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits values: 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 0.0784.

For the equivalent limits in other countries, please consult a competent occupational hygienist or the local regulatory authority.

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

8.3 Personal protective equipment:

Eye and face protection: Eye protection according to ANSI Z.87.1 or other national standards are required.

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

Respiratory protection: Where airborne concentrations are expected to exceed exposure limits, respirators should be used (EN149).

Section 9 Physical and chemical properties

9.1 Appearance:	White, crystalline solid
Odour:	Odourless
Odour threshold:	None
pH @20°C:	10.5 (0.1% solution); 11.0 (1.0% solution); 11.4 (4.0% solution)
Melting point/freezing point:	53.5°C
Initial boiling point and boiling range:	No boiling point can be defined because of decomposition of the active substance
Flash point:	No flash point
Evaporation rate:	Not applicable
Flammability (solid, gas):	Not flammable
Upper/lower flammability or explosive limits:	Not explosive
Vapour pressure:	Negligible at 20°C
Vapour density:	Not applicable
Specific density:	1.74
Solubility in water:	41.9% @20°C, 109.8% @100°C
Partition coefficient: n-octanol/water:	No data
Auto-ignition temperature:	No auto-ignition reactivity.
Decomposition temperature:	No data
Viscosity:	Not applicable
Explosive properties:	Not explosive: does not contain chemical groups associated with explosive properties
Oxidising properties:	Not oxidising: does not contain chemical groups associated with oxidising properties
9.2 Other information	
Molecular weight:	101.83
Formula:	NaBO ₂ ·2H ₂ O

Section 10 Stability and reactivity

- 10.1 Reactivity:** None known.
- 10.2 Chemical stability:** Under normal ambient temperatures (-40°C to +40°C), the product is stable.
- 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 acids.
- 10.5 Incompatible materials:** Material is alkaline and can cause corrosion of metals such as aluminium, tin and zinc.
- 10.6 Hazardous decomposition products:** None.

Section 11 Toxicological information

- 11.1 Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact)**
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.
- (a) Acute toxicity:**
Method: Acute Oral Toxicity Study – OECD Guideline 401
Species: Rat
Dose: 0.2, 1.6, 2, 2.5 g/kg body weight
Routes of Exposure: Oral
Results: Low acute oral toxicity. The oral LD50 value in rats is 3,251 mg/kg bw. Based on the available data, the classification criteria are not met.
- Method: Acute Dermal Toxicity Study – U.S. EPA FIFRA Guidelines
Species: Rabbit
Dose: 2,000 mg/kg bw disodium tetraborate pentahydrate
Routes of Exposure: Dermal
Results: No data on the product itself. Based on similar substance of sodium tetraborate pentahydrate, low acute dermal toxicity. LD50 in rabbits is > 2,000 mg/kg of body weight. Poorly absorbed through intact skin. Based on the available data, the classification criteria are not met.

Method: Acute Inhalation Toxicity Study – OECD Guideline 403

Species: Rat

Dose: 2.12 mg/L disodium tetraborate pentahydrate

Routes of Exposure: Inhalation

Results: No data on the product itself. Based on similar substance of sodium tetraborate pentahydrate, low acute inhalation toxicity. LC50 in rats is > 2.0 mg/l (or g/m³). Based on the available data, the classification criteria are not met.

(b) Skin corrosion / irritation:

Method: Primary Dermal Irritation Study – OECD Guidelines 404

Species: New Zealand White Rabbit

Dose: 0.5 g

Routes of Exposure: Dermal

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

(c) Serious eye damage / irritation:

Results: No data on the product itself. However, based on pH and alkaline reserve, the product is likely to be an eye irritant.

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

Since a low alkaline reserve for sodium metaborates has been estimated, the sodium metaborates are not likely to be serious irritants.

(d) Respiratory or skin sensitization:

Method: Buehler Test - OECD Guideline 406

Species: Guinea Pig

Dose: 0.4 g disodium tetraborate pentahydrate

Routes of Exposure: Dermal

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

(e) Germ cell mutagenicity:

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

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

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

Routes of Exposure: in vitro

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

(f) Carcinogenicity:

Method: OECD 451 equivalent.

Species: B6C3F1 mice

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

Routes of Exposure: Oral feeding study

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

(g) Reproductive toxicity:

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

Species: Rat

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

Routes of Exposure: Oral feeding study

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

Method: Prenatal Developmental Toxicity Study - OECD Guideline 414

Species: Rat

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

Routes of Exposure: Oral feeding study

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

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

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

Species: Human

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

Routes of Exposure: Combined oral ingestion and inhalation

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

(h) STOT-single exposure: No data on the product itself. Inhalation may produce irritation because of the alkalinity of sodium metaborates in aqueous solution. The pH of an aqueous solution of the metaborate at 20°C ranges from 10.5 at 0.1% w/w to 12.0 at 18% w/w. However, an estimated low alkaline reserve for sodium metaborate, indicates that it is not likely to be a serious irritant.

(i) STOT-repeated exposure:

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

Species: Rat

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

Routes of Exposure: Oral feeding study

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

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

Toxicokinetics

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

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

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

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

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

Section 12 Ecological information

12.1 Toxicity

Note that the data values are expressed as boron equivalents. To convert to this product divide the boron equivalent by 0.0784. Studies judged to be unreliable or with insufficient information to evaluate are not included. All toxicity values are reported as added concentrations, i.e. with subtraction of the background concentration of Boron in the test media.

Freshwater

Chronic studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Algal	1	17.5 mg B/L (<i>Pseudokirchneriella subcapitata</i>)	2
Higher plants	1	6.0 mg B/L (<i>Spirodella polyrhiza</i>)	3
Invertebrate	5	6.3 mg B/L (<i>Hyalella azteca</i>) to 30.0 mg B/L (<i>Lampsilis siliquoidea</i>)	4, 5
Fish	6	6.3 mg B/L (<i>Brachydanio rerio</i>) to 36.8 mg B/L (<i>Micropterus salmoides</i>)	6, 7
Amphibian	4	9.4 mg B/L (<i>Xenopus laevis</i>) to 69.9 mg B/L (<i>Bufo fowleri</i>)	8, 9

Results²: Based on the complete data set of 17 species, the HC₅₋₅₀ value of the species sensitivity distribution is 5.7 mg B/L.

Acute studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric EC/LC50)	References
Algal	1	52.4 mg B/L (<i>Pseudokirchneriella subcapitata</i>)	2
Invertebrate	7	112.9 mg B/L (<i>Ceriodaphnia dubia</i>) to >544 mg B/L (<i>Megaloniaias nervosa</i>)	4
Fish	1	79.7 mg B/L (<i>Pimephales promelas</i>)	4

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

Marine and Estuarine Data

Chronic studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Algal	1	27.9 mg B/L (<i>Phaeodactylum tricornutum</i>)	10
Invertebrate	1	16.6 mg B/L (<i>Americamysis bahia</i>)	11

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

Acute studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric EC/LC50)	References
Alga	1	66.0 mg B/L (<i>Phaeodactylum tricornutum</i>)	10
Invertebrate	1	130.0 mg B/L (<i>Litopenaeus vannamei</i>)	12
Fish	1	74 mg B/L (<i>Limanda limanda</i>) (total)	13

Sediment

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric EC/LC50)	References
Invertebrate	1	37.7 mg B/kg dw (<i>Chironomus riparius</i>)	14

Results: The weight of evidence provided by the lack of partitioning of boron to the sediment and the results of the water only/whole sediment toxicity tests indicate that it is unlikely that boron will exert toxic effects via the sediment compartment and that the derivation of a sediment HC₅₋₅₀ value is not warranted for this product.

Sewage Treatment Plants (STP)

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Activated sludge	NA	17.5 mg B/L to 10,000 mg B/L	15, 16
Microbes	3	10 mg B/L (<i>Opercularia bimarginata</i>) to 20 mg B/L (<i>Paramecium caudatum</i>)	17

Results: The lowest NOEC for sewage treatment plant is 10 mg B/L.

Terrestrial Data

Chronic studies

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Plant	28	7.2 mg B/kg dw (<i>Zea mays</i>) to 56 mg B/kg dw (<i>Allium cepa</i>)	18, 19
Invertebrates	9	15.4 mg B/kg dw (<i>Folsomia candida</i>) to 86.7 mg B/kg dw (<i>Caenorhabditis elegans</i>)	20, 21
Soil micro	3	41.3 mg B/kg dw (substrate induced nitrification) to 48.1 mg B/kg dw (soil nitrogen transformation test)	22, 23, 24

Results²: Based on the complete data set, the HC₅₋₅₀ value of the species sensitivity distribution is 11.3 mg B/kg dw.

Phytotoxicity: Boron is an essential micronutrient for healthy growth of plants. It can be harmful to boron sensitive plants in higher quantities. Care should be taken to minimise the amount of borate product released to the environment.

12.2 Persistence and Degradability

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

12.3 Bioaccumulative potential

This product will undergo hydrolysis in water to form undissociated boric acid. Boric acid will not biomagnify through the foodchain. Octanol/Water partition coefficient: Log Pow -1.09 @ 22°C (based on boric acid).

12.4 Mobility in soil

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

12.5 Other adverse effects:

None

Section 13 Disposal considerations

13.1 Disposal methods:

Product packaging should be recycled where possible.

Local authorities should be consulted about any specific local requirements.

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

Section 14 Transport information

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

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

Section 15 Regulatory information

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

International regulations

Chemical Weapon Convention List Schedule I, II & III Chemicals: Not listed.

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

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

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

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

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

United States (TSCA) Active:	7775-19-1
Canada (DSL):	7775-19-1
European Union (EINECS):	231-891-6
Australia (AICS):	10555-76-7
China (IECSC):	10555-76-7
Japan (METI & ISHL):	(1)-69
New Zealand (NZIoC):	10555-76-7
Philippines (PICCS):	10555-76-7

South Korea (KECI):	KE-03507
Taiwan (NECI):	16800-11-6
Thailand (TECI):	Not determined
Vietnam:	7775-19-1

Section 16 Other information

16.1 Date of previous issue: 10 October 2011

16.2 Date of latest revision: January 2020

Revision Details:

Section 1: Updated chemical name, manufacturer, supplier's information, email and emergency telephone numbers.

Section 2: Precautionary statement P281 deleted and replaced by P280.

Section 4, 5, 6, 7, 8, 9, 10, 13, 14, 15 and 16: Updated information.

Section 11 and 12: Endpoints updated.

Updating the SDS format.

Minor typographical corrections.

16.3 References:

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For general information on the toxicology of borates see ECETOC Technical Report No. 63 (1995); Patty's Toxicology, 6th Edition Vol. I, (2012) Chap. 23, 'Boron'.

16.4 Abbreviations and acronyms:

bw: Body weight

dw: Dry weight

EC: Effect concentration

GHS: Global Harmonised System for classification and labelling of chemicals

HC: Hazard Concentration

IATA: International Air Transport Association

IBC: Intermediate Bulk Container

IMDG: International Maritime Dangerous Goods

LC: Lethal Concentration

LD: Lethal Dose

MARPOL: International Convention for the Prevention of Pollutant From Ships, 1973

STOT: Specific Target Organ Toxicity

LOEC: Lowest Observed Effect Concentration

NA: Not applicable.

NOAEL: No observed adverse effect level

NOEC: No Observed Effect Concentration

STP: Sewage Treatment Plant

Precautionary phrases:

Do not ingest.

Keep out of reach of children.

Refer to safety data sheet.

Not for use in food, drugs or pesticides.

Disclaimer:

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