Safety Data Sheet
Date of revision: May 1, 2010
Supersedes: December 26, 2006 version

Dehybor®
Anhydrous Borax

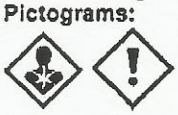
1 Identification

Product name:	**Dehybor®**
Chemical name:	**Disodium Tetraborate, Anhydrous**
Information on manufacturer/importer/distributor:	
Supplier information:	
Company name:	**Rio Tinto Minerals Asia Pte Ltd**
Address:	3 Temasek Avenue, #32-01 Centennial Tower Singapore 039190
Tel:	(65) 6464 6000
Email:	rtm.msds@riotinto.com
Emergency phone number:	(1) 303 713 5050 (24-Hr Non toll-free number)
Recommended use and restriction on use:	Industrial manufacturing

2 Hazards identification

Classification of the substance:
Reproductive Toxicity Category 2
Serious Eye Damage / Eye Irritation Category 2A
Acute Toxicity (Oral) Category 5

GHS warning label elements, including precautionary statements
Pictograms:



Signal word: Warning

Hazard statement:
Suspected of damaging fertility or the unborn child.
Causes serious eye irritation.
May be harmful if swallowed.

Precautionary statements:
Prevention:
Do not handle until all safety precautions have been read and understood.
Use personal protective equipment as required.
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:
Disposal:
Dispose of contents/container in accordance with local regulation.

Other hazards which do not result in classification: None.

3 Composition/information on ingredients

Chemical name	Common names and synonyms	CAS No.	Formula	% content
Disodium tetraborate, anhydrous	Sodium tetraborate, disodium tetraborate, anhydrous borax	1330-43-4	$Na_2B_4O_7$	>99.0

4 First aid measures

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.

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

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.

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).

Indication of immediate medical attention and special treatment needed, if necessary: Observation only is required for adult ingestion of 5 grams of *Dehybor*. For ingestion in excess of 5 grams, maintain adequate kidney function and force fluids. Gastric lavage is recommended for symptomatic patients only. Haemodialysis should be reserved for massive acute ingestion or patients with renal failure. Boron analyses of urine or blood are only useful for documenting exposure and should not be used to evaluate severity of poisoning or to guide treatment[1].

5 Fire-fighting measures

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

Specific hazards arising from the chemical: None. The product is not flammable, combustible or explosive. The product is itself a flame retardant.

Special protective equipment and precautions for fire fighters: None

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures: Please refer to SECTION 8 "Exposure controls" for further information.

Environmental precautions: *Dehybor* is a water-soluble white powder that may cause damage to trees or vegetation by root absorption (see section 12). Where possible, remove any intact containers from the water. 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 (see sections 12, 13 and 15).

Methods and materials for containment and cleaning up: Vacuum, shovel or sweep up *Dehybor* and place in containers for disposal in accordance with applicable local regulations. Avoid contamination of water bodies during clean up and disposal. (Refer to section 8 for personal protective equipment.) Dispose of in accordance with local regulations.

7 Handling and storage

Precautions for safe handling: 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. Good housekeeping procedures should be followed to minimise dust generation and accumulation.

Conditions for safe storage (including any incompatibilities): Store at room temperature. Keep in a dry, well ventilated place.

8 Exposure controls/personal protection

Occupational exposure limits: Rio Tinto Minerals recommends and applies internally an Occupational Exposure Limit (OEL) of 1 mg B/m^3. To convert *Dehybor* into equivalent boron (B) content, multiply by 0.2149.
For the equivalent limits in other countries, please consult a competent occupational hygienist or the local regulatory authority.

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

Personal protective equipment:
Respiratory protection: Where airborne concentrations are expected to exceed exposure limits, respirators should be used.

Eye protection: Safety glasses conforming to CE EN166, ANSI Z.87.1 or other national standards are required.

Hand protection: Not required for normal industrial handling and use but impervious gloves (rubber, nitrile, or butyl) may be warranted if environment is excessively dusty.

Skin and Body protection: Not required for normal industrial exposures but protective clothing may be warranted if environment is excessively dusty.

9 Physical and chemical properties

Appearance:	White, crystalline solid
Odour:	Odourless
Odour threshold:	None
pH:	9.23 (2.48% solution) @20°C
Melting point/freezing point:	742°C (Heated in closed space)
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
Solubility in water:	27.0 g/L @ 20°C
Vapour density:	Not applicable
Specific density:	2.354
Partition coefficient: n-octanol/water:	No data
Auto-ignition temperature:	No auto-ignition reactivity.
Decomposition temperature:	No data
Viscosity:	Not applicable
Molecular weight:	201.22

10 Stability and reactivity

Chemical stability: *Dehybor* is a stable product.
Possibility of hazardous reactions: None.
Conditions to avoid: Avoid moisture (caking).
Incompatible materials: Reaction with strong reducing agents such as metal hydrides or alkali metals will generate hydrogen gas which could create an explosive hazard.
Hazardous decomposition products: None.

11 Toxicological Information

Information on the likely routes of exposure: 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.

Information on heath hazards:
Acute toxicity:
Oral: Category 5. LD_{50} in rats is >2,500 mg/kg of body weight.
Dermal: Not classified. LD_{50} in rabbits is > 2,000 mg/kg of body weight. Poorly absorbed through intact skin.
Inhalation (dust, mist): Not classified. LC_{50} in rats is > 2.0 mg/L (or g/m^3).

Skin corrosion/irritation: No data are available on this product. Not classified (based on sodium tetraborate decahydrate).

Serious eye damage/irritation: Category 2A.
No data are available on this product. Serious eye irritant in rabbits (based on sodium tetraborate decahydrate).
Fifty years of occupational exposure indicate no adverse effects on human eye.

Respiratory/Skin sensitisation: No data are available on this product. Not classified (based on sodium tetraborate decahydrate).

Carcinogenicity: No data are available on this product. Not classified (based on sodium tetraborate decahydrate). No evidence of carcinogenicity in rats and mice[3].

Germ cell mutagenicity: No data are available on this product. Not classified (based on boric acid).

Reproductive/developmental toxicity: Category 2.
Animal feeding studies with boric acid and sodium tetraborate in rat, mouse and dog at high doses have demonstrated effects on fertility and testes[2]. Studies with the chemically related boric acid in rat, mouse and rabbit, at high doses, demonstrate developmental effects on the foetus including foetal weight loss and minor skeletal variations. The lowest NOAEL is 9.6 mg B/kg in rats, based on developmental effects. The doses administered were many times in excess of those which humans would normally be exposed.[3,4,5]

Specific target organ toxicity (single exposure): Not classified.

Specific target organ toxicity (repeated exposure): Not classified.

Aspiration hazard: Not classified.

12 Ecological information

Aquatic/terrestrial ecological toxicity: Not classified.

General: Boron occurs naturally in sea water, freshwater and soils. Sea water concentrations are about 5 mg B/L. Most freshwater concentrations are below 1 mg B/L, often below 0.1 mg B/L. Soil concentrations range from 10 to 300 mg B/kg dry soil, although not all boron is bioavailable in soil. Soil concentrations reflect the local types of rock; sedimentary rocks have higher concentrations of boron than igneous rocks.
The lowest values from acute toxicity tests judged to be of reliable quality are given below. The data are for similar inorganic borates as this product has not been tested. To convert *Dehybor* into equivalent boron (B) content, multiply by 0.2149 (e.g. 1 kg *Dehybor* contains 0.2149 kg boron).

Aquatic toxicity:

Substance	Result	Species	Exposure
Boric acid	EC_{50} = 40 mg B/L	Algae: *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum*)[6]	74.5 hours
	EC_{50} = 133 mg B/L	Invertebrate: *Daphnia magna*[7]	48 hours
	LC_{50} = 125 mg B/L	Fish: *Catostomas latipinnis*[8]	28 days

Wastewater Treatment Plant data:
Respiration rate activated sludge
3-hr EC_{50} = 175 mg B/L (based on boric acid)

Persistence/degradability: It is an inorganic substance and does not biodegrade.

Bioaccumulative potential: This product will undergo hydrolysis in water to form undissociated boric acid in the environment. Boric acid will not biomagnify through the foodchain.

Octanol/Water partition coefficient: Log Pow = -1.09 @ 22°C (based on boric acid).

Soil mobility: The product is soluble in water. Adsorption coefficients indicate that inorganic borates are weakly adsorbed to soils, and will leach through normal soil. Adsorption to sediments is insignificant.

Other adverse effects:
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.

13 Disposal considerations

Disposal methods: This product should be disposed of via a licensed waste disposal contractor. Tonnage quantities of product are not recommended to be sent to landfills. Such product should, if possible, be used for an appropriate application.
Local authorities should be consulted about any specific local requirements.

Disposal considerations (including how to dispose of contaminated containers and packaging): Dispose of contents/container in accordance with local regulation. Local authorities should be consulted about any specific local requirements.

14 Transport information

Dehybor is not classified for transport in any international mode (e.g. ADR, IMDG, IATA, DOT).
UN number: Not regulated
UN proper shipping name: Not regulated
Transport hazard class: Not regulated
Packing group (if applicable): Not regulated
Marine Pollutant: No
Special precautions: This product should be transported according to the related regulations. Please refer to Section 7 for handling and Section 6 for accidental release measure.

15 Regulatory information

Other regulations based on domestic or foreign laws: Ensure all national/local regulations are observed.

Chemical inventory listing:

U.S. EPA TSCA Inventory:	1330-43-4
Canadian DSL:	1330-43-4
EINECS:	215-540-4
Australia AICS:	1330-43-4
China IECSC:	1330-43-4
Japanese METI:	(1)-69
New Zealand NZIoC:	1330-43-4
Philippines PICCS:	1330-43-4
South Korea KECI:	KE-12384

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

16 Other information

References and sources:

1. Litovitz T L, Norman S A, Veltri J C, Annual Report of the American Association of Poison Control Centers Data Collection System. Am. J. Emerg. Med. (1986), 4, 427-458.
2. Weir R J, Fisher R S, Toxicol. Appl. Pharmacol., (1972), 23, 351-364.
3. National Toxicology Program (NTP) – Technical Report Series No. TR324, NIH Publication No. 88-2580 (1987), PB88 213475/XAB.
4. Fail *et al.*, Fund. Appl. Toxicol. (1991) 17, 225-239.
5. Heindel *et al.*, Fund. Appl. Toxicol. (1992) 18, 266-277.
6. Hanstveit and Oldersma (2000) Unpubished report to Borax Europe Ltd.
7. Gersich (1984) Environ Toxicol Chem 3, 89-94.
8. Hamilton and Buhl (1997) Ecotox Environ Safety 38, 296-308.

For general information on the toxicology of borates see ECETOC Technical Report No. 63 (1995); Patty's Industrial Hygiene and Toxicology, 5th Edition Vol. III, (2001) Chap. 45, 'Boron'.

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Others:
Revision details:
Format updated in compliance with GHS format.
Section 1: Emergency phone number added.
Sections 2, 3, 8, 9, 11, 12, 13, 15, 16: updated to reflect the new GHS hazard classification of product.

Precautionary phrases:
Keep out of reach of children.
Do not ingest.
Not for use in food, drugs or pesticides.
Refer to safety data sheet.

Disclaimer:
The information provided in this datasheet is correct to the best of our knowledge, information and belief at the date of its publication.