

BORAX DECAHYDRATE
HEALTH AND SAFETY DATA SHEET

1. Identification of the Substance / Preparation and the Company / Undertaking

Product Name

Borax Decahydrate

Chemical name/synonyms

Sodium tetraborate decahydrate, disodium tetraborate decahydrate, Borax

Use of the substance / preparation

The product is used in industrial manufacturing, in particular in:

- Ceramics
- Detergent
- Borosilicate glass
- Insulation fibreglass
- Nonferrous & Metallurgical Industry
- Micro-nutrient

Supplier

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2. Composition / Information on Ingredients

Chemical Nature of the Substance / Preparation

The product contains greater than 99.5 percent (%) Borax decahydrate $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$

Components

CAS- N°	EINECS	Name	EC Classification
1303-96-4	215-540-4	Borax decahydrate	no classification

For other "Chemical inventory listing", please refer to section 15.

3. Hazards Identification

Emergency overview

Borax decahydrate is a white odourless, crystal substance that is not flammable, combustible, or explosive, and has low acute oral and dermal toxicity.

Potential health effects

Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because borax decahydrate is poorly absorbed through intact skin.

Inhalation

Occasional mild irritation effects to nose and throat may occur from inhalation of borax decahydrate dusts at levels greater than 10 mg/m^3 .

Eye contact

Borax decahydrate is a mild eye irritant.

Skin contact

Borax decahydrate does not cause irritation to intact skin.

Ingestion

Products containing borax decahydrate are not intended for ingestion. Borax decahydrate has low acute toxicity. Small amounts (e.g. a teaspoonful) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms.

Reproductive/Developmental

Animal ingestion studies in several species, at high doses, indicate that borates cause reproductive and developmental effects. A human study of occupational exposure to borate dust showed no adverse effect on reproduction.

Potential ecological effects

Large amounts of borax decahydrate can be harmful to plants and other species. Therefore releases to the environment should be minimised.

Signs and symptoms of exposure

Symptoms of accidental over-exposure to borax decahydrate have been associated with ingestion or absorption through large areas of damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling (see section 11).

4. First aid measures**Skin contact**

No treatment necessary because non-irritating.

Eye contact

Use eye wash fountain or fresh water to cleanse 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.

Ingestion

If large amounts are swallowed (i.e. more than one teaspoon), give two glasses of water or milk to drink and seek medical attention.

Note to physicians

Observation only is required for adult ingestion of less than 9 grams of borax decahydrate. For ingestion in excess of 9 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] (see section 11).

5. Fire-fighting measures**General hazard**

None, because borax decahydrate is not flammable, combustible or explosive. The product is itself a flame retardant.

Extinguishing media

Any fire extinguishing media may be used on nearby fires.

6. Accidental release measures

Personal precautions

Avoid dust formation. In case of exposure to high level of airborne dust, wear a personal respirator in compliance with national legislation.

Environmental precautions

Borax decahydrate is a water-soluble white Crystal/powder that may cause damage to trees or vegetation by root over absorption (see section 12).

Methods for cleaning up (Land spill)

Vacuum, shovel or sweep up borax decahydrate and place in containers for disposal in accordance with applicable local regulations. Avoid contamination of water bodies during clean up and disposal. No personal protective equipment is needed to clean up land spills.

Spillage into water

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).

7. Handling and Storage

Safe Handling Advice and storage

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. Your supplier can advise you on safe handling, please contact him.

Specific Use(s)

The product should be kept away from strong reducing agents.

8. Exposure controls / Personal protection

Exposure limit values

Respect regulatory provisions for dust (inhalable and respirable).

Exposure controls

A. OCCUPATIONAL EXPOSURE CONTROLS

Use local exhaust ventilation to keep airborne concentrations of borax decahydrate dust below permissible exposure levels.

- *Respiratory protection*
Where airborne concentrations are expected to exceed exposure limits, respirators should be used.
- *Eyes and hands protection*
Goggles and gloves are not required for normal industrial exposures, but may be warranted if environment is excessively dusty.

B. ENVIRONMENTAL EXPOSURE CONTROLS

No special requirement.

9. Physical and chemical properties

General information

Physical state	crystalline solid
Colour	white
Odour	odourless
Molecular weight	381.37
Specific gravity	1.71

Important health, safety and environmental information

Melting temperature	62°C (heated in closed space)
Boiling point	1575 °C
Flash point	Non flammable
Explosion hazard	Non explosive
Solubility in water	4.7% @ 20°C; 65.6% @ 100°C
Vapour pressure	Negligible @ 20°C
pH @ 20°C	9.3 (0.1 % solution)
	9.2 (1.0% solution)
	9.3 (4.7 % solution)

10. Stability and Reactivity**General**

Borax decahydrate is a stable product, but when heated it loses water, eventually forming anhydrous borax ($\text{Na}_2\text{B}_4\text{O}_7$).

Hazardous decomposition or polymerisation

None

Incompatible materials and conditions to avoid:

Reaction with strong reducing agents such as metal hydrides, acetic anhydride or alkali metals will generate hydrogen gas which could create an explosive hazard.

11. Toxicological information**ACUTE TOXICITY****Ingestion^[2]**

Low acute oral toxicity; LD_{50} in rats is 6,000 mg/kg of body weight.

Skin

Low acute dermal toxicity; LD_{50} in rabbits is greater than 2,000 mg/kg of body weight. Borax decahydrate is poorly absorbed through intact skin.

Inhalation

Low acute inhalation toxicity; LC_{50} in rats is greater than 2.0 mg/l (or g/m^3).

Skin irritation

Non-irritant.

Eye irritation

Mild eye irritant in rabbits. Fifty years of occupational exposure to borax decahydrate indicate no adverse effects on human eye. Borax decahydrate is a constituent of eye lotions.

Sensitisation

Borax decahydrate is not a skin sensitiser.

OTHER

Reproductive/Developmental toxicity

Animal feeding studies 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 doses administered were many times in excess of those which humans would normally be exposed to ^[3,4,5].

Carcinogenicity/Mutagenicity

Not a carcinogen.

Not a mutagen.

Human data

Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid dust and sodium borate dust. A recent epidemiology study under the conditions of normal occupational exposure to borate dusts indicated no effect on fertility.

12. Ecological information

ECOTOXICITY DATA

General

Boron occurs naturally in sea water at an average concentration of 5 mg B/l and fresh water at 1 mg B/l or less. In dilute aqueous solutions the predominant boron species present is undissociated boric acid.

Phytotoxicity

Boron is an essential micronutrient for healthy growth of plants, however, 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.

Algal toxicity^[6]

Green algae, *Scenedesmus subspicatus*

96-hr IC₁₀ = 24 mg B/l †

Invertebrate toxicity^[7]

Daphnia, *Daphnia magna* Straus

24-hr IC₅₀ = 242 mg B/l †

Fish toxicity

Sea water^[8]:

Dab, *Limanda limanda* 96-hr LC₅₀ = 74 mg B/l †

Fresh water^[9]:

Rainbow trout, *Oncorhynchus mykiss* (embryo-larval stage)

24-day LC₅₀ = 88 mg B/l †

32-day LC₅₀ = 54 mg B/l †

Goldfish, *Carassius auratus* (embryo-larval stage)

7-day LC₅₀ = 65 mg B/l †

3-day LC₅₀ = 71 mg B/l †

Test substance: † Sodium tetraborate

ENVIRONMENTAL FATE DATA

Persistence/Degradation

Boron is naturally occurring and ubiquitous in the environment. Borax decahydrate decomposes in the environment to natural borate.

Octanol/Water partition coefficient

No value. In aqueous solution borax decahydrate is converted substantially into undissociated boric acid.

Soil mobility

The product is soluble in water and is leachable through normal soil.

13. Disposal considerations

Disposal guidance

Small quantities of borax decahydrate can usually be disposed of at landfill sites. No special disposal treatment is required, but local authorities should be consulted about any specific local requirements. Tonnage quantities of product are not recommended to be sent to landfills. Such product should, if possible, be used for an appropriate application.

14. Transport information

International transportation

Borax decahydrate has no UN Number, and is not regulated under international rail, road, water or air transport regulations.

15. Regulatory information

General

Ensure all national/local regulations are observed.

Clean Air Act (Montreal Protocol)

Borax decahydrate was not manufactured with and does not contain any Class I or Class II ozone depleting substances.

Chemical inventory listing

- U.S. EPA TSCA Inventory	1303-96-4
- Canadian DSL	1303-96-4
- EINECS	215-540-4
- South Korea	9212-848
- Japanese MITI	(1)-69

16. Other information

References

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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. Guhl W, SÖFW-Journal (1992) 181 (18/92), 1159-1168
7. Schöberl P, Marl and Huber L (1988) Tenside Surfactants Detergents 25, 99-107
8. Hugman S J and Mance G (1983) Water Research Centre Report 616-M
9. Birge W J, Black J A, EPA-560/-76-008 (April 1977) PB 267 085

For general information on the toxicology of borates see ECETOC Technical Report No. 63 (1995); Patty's Industrial Hygiene and Toxicology, 4th Edition Vol. II, (1994) Chap. 42, 'Boron'.