Material Safety Data Sheet

DATE OF ISSUE June 2005
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1 Chemical product and company identification

Product name: Granubor 2
Product use: Agricultural Micronutrient
Chemical formula: $Na_2B_4O_7Ÿ5H_2O$
Chemical name/synonyms: sodium tetraborate pentahydrate
Chemical family: inorganic borates
CAS registry Number: 12179-04-3

(Refer to section 15 for TSCA/ DSL chemical inventory listing)

MANUFACTURER:

U.S. Borax Inc.
26877 Tourney Road
Valencia, CA 91355-1847

EMERGENCY PHONE NUMBER

24 Hr. Medical Info. Service: **(866) 334-3571 (toll free)**
(661) 284-5200
Chemtrec (Spills): **(800) 424-9300**

2 Composition/information on ingredients

This product contains 99-100% sodium tetraborate pentahydrate, which is hazardous under the OSHA Hazard Communication Standard and under the Canadian Controlled Products Regulations of the Hazardous Products Act, (WHMIS) based on chronic animal studies. Refer to section 3 and 11 for details on hazards.

3 Hazard identification

Overview

Granubor 2 is a white, odorless, granular substance that is *not* flammable, combustible or explosive and low acute oral and dermal toxicity.

Potential ecological effects

Large amounts *Granubor 2* can be harmful to plants and other species. Therefore releases to the environment should be minimized, except when its use on farms has been recommended to correct a boron deficiency.

Potential health effects

Routes of exposure: Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because *Granubor 2* is not expected to be readily absorbed through intact skin.

Inhalation: Occasional mild irritation to the nose and throat may occur from inhalation of *Granubor* 2 dust at levels greater than 10 mg/m^3 .

Eye contact: *Granubor 2* is not irritating to the eyes in normal industrial use.

Skin contact: *Granubor 2* does not cause irritation to intact skin.

Ingestion: *Granubor 2* has low acute toxicity and is *not* intended for ingestion. Small amounts (e.g. 1 teaspoon) swallowed accidentally are not likely to cause effects; swallowing larger amounts may cause gastrointestinal symptoms.

Cancer: *Granubor 2* is not a known carcinogen.

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

Target organs: No target organ has been identified in humans. High dose animal ingestion studies of borates indicate the testes are the target organs in male animals.

Signs and symptoms of exposure: Symptoms of accidental over-exposure to *Granubor 2* include nausea, vomiting and diarrhea, with delayed effects of skin redness and peeling. These symptoms have been associated with accidental over exposure to the chemically related substance boric acid.

Refer to Section 11 for details on toxicological data.

4 First aid measures

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: Flush skin with plenty of water.

Ingestion: If larger amounts are swallowed, give two glasses of water to drink and seek medical attention.

Note to physicians: Observation only is required for adult ingestion of a few grams of inorganic borate salt. For ingestion of larger amounts, maintain adequate kidney function and force fluids. Gastric lavage is recommended for symptomatic patients only. Hemodialysis 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.

Refer to Section 11 for details.

5 Fire fighting measures

General hazard: None. *Granubor 2* is not flammable, combustible, or explosive. The product is itself a flame retardant.

Extinguishing media: Any fire extinguishing media may be used.
Flammability classification (29 CFR1910.1200): Non-flammable solid.

6 Accidental release measures

General: *Granubor 2* is a water soluble white powder that may at high concentrations cause damage to trees or vegetation by root absorption. (Refer to Ecological information, Section 12, for specific information).

Land spill: Vacuum, shovel, or sweep up *Granubor 2* and place in containers for disposal in accordance with applicable local regulations. Avoid contamination of water bodies during clean up and disposal. See personal protective equipment recommendations in Section 8.

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. *Granubor 2* is a non-hazardous waste when spilled or disposed of as defined by RCRA, 40 CFR 261.

(Refer to Sections 12, 13 and 15 for additional information).

7 Handling and storage

General: No special handling precautions are required, but dry, indoor storage is recommended. To maintain package integrity and to minimize caking, the product should be handled on a first-in first-out basis. Good housekeeping procedures should be followed to minimize dust generation and accumulation.

Storage temperature: Ambient

Storage pressure: Atmospheric

Special sensitivity: Moisture (caking)

8 Exposure controls/personal protection

Engineering controls: Use local exhaust ventilation to keep airborne concentrations of *Granubor 2* dust under permissible exposure limits.

Personal protection: Where airborne concentrations are generated, respirators should be used. Eye goggles and latex or rubber gloves are recommended for normal industrial exposures to protect from splashing and overspray.

Occupational exposure limits: Sodium tetraborate pentahydrate (*Granubor 2*) is regulated by Cal/OSHA and as a nuisance dust by OSHA.

Cal OSHA PEL: 5 mg/ m^3
OSHA PEL (total dust): 10 mg/ m^3

9 Physical and chemical properties

Appearance: white odorless crystalline solid
Specific gravity: 1.81
Vapor pressure: Negligible @ 20°C
Solubility in water: 3.8% @ 20°C; 51.2% @ 100°C
Melting point: 200°C (392°F) (heated in closed spaces)
pH @ 20°C: 9.3 (3.0% solution)

Formula weight: 291.35
Octanol/water partition coefficient: Log P = -0.7570 at 25° C based on boric acid. Sodium tetraborate will undergo hydrolysis in water to form undissociated boric acid. No biodegradation data is available, as sodium tetraborate is an inorganic substance.

10 Stability and reactivity

General: *Granubor 2* is a stable product, but when heated it loses water, eventually forming anhydrous borax ($Na_2B_4O_7$).

Incompatible materials and conditions to avoid: Reaction with strong reducing agents, such as metal hydrides or alkali metals, will generate hydrogen gas, which could create an explosive atmosphere.

Hazardous decomposition: None.

11 Toxicological information

Acute toxicity

Ingestion: Low acute oral toxicity; LD50 in rats is 3,200 to 3,400
mg/kg of body weight.

Skin/dermal: Low acute dermal toxicity; LD50 in rabbits is greater than 2,000 mg/kg of body weight. *Granubor 2* is poorly absorbed through intact skin.

Inhalation: Low acute inhalation toxicity; LC50 in rats is greater than 2.0 mg/L (or g/m3).

Skin irritation: Non-irritant.

Eye irritation: Draize test in rabbits produced eye irritation effects. Fifty years of occupational exposure to sodium borates indicates no adverse effects on human eye. Therefore, *Granubor 2* is not considered to be a human eye irritant in normal industrial use.

Sensitization: *Granubor 2* is not a skin sensitizer.

Other

Reproductive/developmental toxicity: Animal feeding studies in the rat, mouse and dog, at high doses, have demonstrated effects on fertility and testes[2]. Also, studies with chemically related boric acid in the rat, mouse and rabbit, at high doses, demonstrate developmental effects on the fetus including fetal 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: No evidence of carcinogenicity in mice. No mutagenic activity was observed for boric acid in a battery of short-term mutagenicity assays.

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. An epidemiology study under the conditions of normal occupational exposure to borate dusts indicated no effect on fertility.

12 Ecological information

Ecotoxicity data for boric acid

General: Boron (B) is the element in sodium tetraborate pentahydrate (*Granubor 2*) which is used by convention to report borate product ecological effects. 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 diluted aqueous solutions the predominant boron species present is undissociated boric acid. To convert sodium tetraborate pentahydrate into the equivalent boron (B) content, multiply by 0.1484.

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 minimize the amount *Granubor 2* released to the environment. *Granubor 2* should only be used as part of a balanced plant nutrition program preferably after soil and/or tissue analysis.

Algal toxicity[6]:
Green algae, *Scenedesmus subspicatus*
96-hr EC_{10} = 24 mg B/l*

Invertebrate toxicity[7]:
Daphnids, *Daphnia magna Straus*[7]
24-hr EC_{50} = 242 mg B / L^+
Midge larva, *Chironomus riparius*
28-day LC_{50} = 278 mg B/ L dw^+
Earthworm, *Eisenia fetida*
14-day LC_{50} = 175 mg B/ L^+
Respiration rate activated sludge
3-hr EC_{50} = 175 mg B/ L

Fish toxicity:
Sea-water[8]:
Dab, *Limanda limanda*
96-hr LC_{50} = 74 mg B/l*

Fresh water[9]:
Rainbow trout, *Oncorhynchus mykiss* (embryo-larval stage)
24-day LC_{50} = 88 mg B/l^+
32-day LC_{50} = 54 mg B/l^+
Goldfish, *Carassius auratus* (embryo-larval stage)
7-day LC_{50} = 65 mg B/l^+
3-day LC_{50} = 71 mg B/l^+

Environmental fate data

Bioaccumulation / Degradation: Low bioaccumulation potential; log Pow = 0.7570 @ 25°C, based on boric acid. Additionally sodium tetraborate will undergo hydrolysis in water to form undissociated boric acid. Boric acid will not biomagnify through the food chain.

Soil mobility: sodium tetraborate is soluble in water. Absorption coefficients indicate that sodium tetraborate is absorbed to sandy loam soil, loam soil, and low humic content sand soil and that absorption to humic sand soil is insignificant. decomposes in the environment to natural borate. Adsorption of sodium tetraborate to sediments is insignificant.

Test substance * sodium tetraborate
$^+$ boric acid

13 Disposal considerations

Disposal guidance: Small quantities of Granubor 2 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.

RCRA (40 CFR 261): sodium tetraborate is not listed as hazardous waste under any section of the Federal Conservation and Recovery Act (RCRA)

NPRI (Canada): Not listed N/A

14 Transport information

DOT hazardous classification: *Granubor 2*, sodium tetraborate pentahydrate, is *not* regulated by the U.S. Department of Transportation (DOT) and is therefore not considered a Hazardous Material.

TDG Canadian transportation: *Granubor 2* is *not* regulated under Transportation of Dangerous Goods (TDG).

International transportation: N/A, Has no UN number - Not regulated

15 Regulatory information

OSHA/Cal OSHA: This MSDS document meets the requirements of both OSHA (29 CFR 1910.1200) and Cal OSHA (Title 8 CCR 5194 (g)) hazard communication standards. Refer to Section 8 for occupational exposure limits.
WHMIS classification: *Granubor 2* is classified as Class D-Division 2A under Canadian WHMIS guidelines.
Chemical inventory listing: Sodium tetraborate pentahydrate, *Granubor 2*, appears on several chemical inventory lists including US TSCA, Canada DSL, EU EINECS, Japan, Australia, Philippines, and Korea under the CAS number representing the anhydrous form of this inorganic salt.

U.S. EPA TSCA	1330-43-4
Canada DSL	1330-43-4
EU EINECS	215-540-4
South Korea	1-760
Japanese MITI	(1)-69

RCRA: not listed as a hazardous waste under any section of the Resource Conservation and recovery Act (40 CFR 261 et seq)

Superfund: not listed under CERCLA or its 1986 amendments; Sara 313 does not apply; Sara 311 / 312 applies based on acute oral
Safe Drinking Water Act (SDWA) / Clean Water Act (Federal Water Pollution Control Act: is not a discharge covered by water quality criteria and is not listed under any section of these acts. Consult state and local regulations for possible water quality guidelines or advisories regarding boron compounds.
Canadian drinking water guideline: An "Interim Maximum Acceptable Concentration" (IMAC) is currently set at 5 mg/l boron.
IARC: not listed
NTP annual report on carcinogens: not listed
OSHA Carcinogen: not listed
California Proposition 65: not listed
Clean Air Act (Montreal Protocol): *Granubor 2* was not manufactured with and does not contain any Class I or Class II ozone depleting substances.

16 Other information

References

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. **4**: 427-458 (1986).
2) Weir R J, Fisher R S, Toxicol. Appl. Pharmacol. **23**: 351-364 (1972).
3) Fail *et al*., Fund. Appl. Toxicol. **17**: 225-239 (1991).
4) Price *et al*., J. Am. Coll. Toxicol. **14**: (2), 173 (Abst. P-17) (1995).
5) Murray F J, Regul. Toxicol. Pharmacol. (Dec. 1995)
6) National Toxicology Program (NTP)–Toxicology and carcinogenesis studies of boric acid in $B6C3F_1$ mice, Tech. Report Ser. No. 324, U.S. Dept. of Health and Human Services. NIH Publ. No. 88-2580 (1987).
7) Whorton *et al*., Occup. Environ. Med. **51**: 761-767 (1994).
8) Schöberl *et al*, Tenside Surfactants Detergents **25**: 99-107 (1988).
9) Hugman S J, Mance G, Water Research Centre Report 616-M (1983).
10) Butterwick L, de Oude N, Raymond K, Ecotoxicol. Environ. Safety **17**: 339-371 (1989).

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

Revisions include: June 13, 2005 – Section 12 update;

Product label text hazard information:

- May be harmful if swallowed.
- Avoid contamination of food or feed.
- Not for food, drug or pesticidal use.
- Refer to MSDS.
- KEEP OUT OF REACH OF CHILDREN.

National Fire Protection Assoc. (NFPA) classification:

Health	0
Flammability	0
Reactivity	0

Hazardous Materials Information Systems (HMIS):

Red: (Flammability)	0
Yellow: (Reactivity)	0
Blue: (Acute Health)	1*

*Chronic effects

For further information contact:

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