

5 Firefighting measures

General hazard: None, because *Granubor* 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.

Flammability classification (29 CFR 1910.1200): Non-flammable solid.

6 Accidental release measures

General: *Granubor* 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* and place in containers for disposal in accordance with applicable local regulations. Avoid contamination of water bodies during cleanup and disposal. Personal protective equipment is not needed to cleanup 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. (Refer to Sections 12, 13 and 15 for additional information.)

Granubor is a non-hazardous waste when spilled or disposed of, as defined in the Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261). (Refer to Regulatory information, Section 15, for additional references.)

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 of the product, bags 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* dust below permissible exposure levels.

Personal protection: Where airborne concentrations are expected to exceed exposure limits, NIOSH/MSHA certified respirators should be used. Eye goggles and gloves are not required for normal industrial exposures, but may be warranted if environment is excessively dusty.

Occupational exposure limits: The only specifically regulated chemical component of *Granubor* is sodium tetraborate pentahydrate.

ACGIH/TLV:	1 mg/m ³
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: 1.75

Vapor pressure: Negligible @ 20°C

Solubility in water: 3.6% @ 20°C

Melting point: >200°C (392°F) (heated in closed space)

pH @ 20°C: 9.15 (3.0% solution)

10 Stability and reactivity

General: *Granubor* is a stable product, but when heated, it loses water, eventually forming anhydrous borates and sodium sulfate.

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 hazard.

Hazardous decomposition: None.

11 Toxicological information

Acute toxicity

Ingestion: Low acute oral toxicity; LD₅₀ in rats is greater than 2,000 mg/kg of body weight.

Skin/dermal: No experimental data; low acute dermal toxicity; LD₅₀ in rabbits is expected to be greater than 2,000 mg/kg of body weight. *Granubor* is poorly absorbed through intact skin.

Inhalation: No experimental data. Other borates indicate low acute inhalation toxicity. Many years of occupational exposure to boric acid and other borates indicate no increase in pulmonary disease.

Skin irritation: No experimental test data. Similar sodium borate substances are non-irritants.

Eye irritation: Draize test in rabbits produced eye irritation effects. Many years of occupational exposure to *Granubor* indicates no adverse effects on human eye. *Granubor* is considered to be a mild eye irritant.

Sensitization: No experimental test data. However, other borates are not skin sensitizers.

Other

Reproductive/developmental toxicity: Animal feeding studies in rat, mouse and dog, at high doses, have demonstrated effects on fertility and testes². Studies with the 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^{3, 4}. The doses administered were many times in excess of those to which humans would normally be exposed⁵.

Carcinogenicity/mutagenicity: No evidence of carcinogenicity in mice⁶. 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. A recent epidemiology study under the conditions of normal occupational exposure to borate dusts indicated no effect on fertility⁷.

12 Ecological information

Ecotoxicity data

General: Boron (B) is the element in *Granubor* which is used by convention to report borate product ecological effects. It occurs naturally in seawater at an average concentration of 5 mg B/L and generally occurs in freshwater at concentrations up to 1 mg B/L. 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 high quantities. Care should be taken to minimize the amount of *Granubor* accidentally released to the environment. *Granubor* should only be used as part of a balanced plant nutrition program preferably after soil and/or tissue analysis.

Algal toxicity:

Green algae, *Scenedesmus subspicatus*
96-hr EC₁₀ = 24 mg B/L†

Invertebrate toxicity⁸:

Daphnids, *Daphnia magna* Straus
24-hr EC₅₀ = 242 mg B/L†

Test substance: † sodium tetraborate

Fish toxicity:

Seawater⁹:

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

Freshwater¹⁰:

Rainbow trout, *S. gairdneri* (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†

Environmental fate data

Persistence/degradation: Boron is naturally occurring and ubiquitous in the environment. *Granubor* decomposes in the environment to natural borate.

Octanol/water partition coefficient: No value. In aqueous solution the chemical constituents of *Granubor* are converted substantially into undissociated boric acid.

Soil mobility: *Granubor* is soluble in water and is leachable through normal soil.

13 Disposal considerations

Disposal guidance: Small quantities of *Granubor* 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 should, if possible, be used for an appropriate application.

RCRA (40 CFR 261): *Granubor* is not listed under any sections of the Federal Resource Conservation and Recovery Act (RCRA).

NPRI (Canada): *Granubor* is not listed on the Canadian National Pollutant Release Inventory.

Refer to Section 15 for additional regulatory information.

14 Transport information

DOT hazardous classification: The chemical constituents of *Granubor* are not regulated by the U.S. Department of Transportation (DOT) and are therefore not considered a hazardous material/substance.

TDG Canadian transportation: The chemical constituents of *Granubor* are not regulated under Transportation of Dangerous Goods (TDG).

International transportation: The chemical constituents of *Granubor* do not have UN Numbers, and are not regulated under international rail, road, water or air transport regulations.

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 regulatory exposure limits.

WHMIS classification: *Granubor* is classified as Class D-Division 2A under Canadian WHMIS guidelines.

Chemical inventory listing: The primary chemical constituents of *Granubor*, sodium tetraborate pentahydrate and disodium octaborate tetrahydrate, appear on several chemical inventory lists (including the EPA TSCA inventory, Canadian DSL, European EINECS, Japanese MITI, Australian and Korean lists) sometimes under the CAS No. representing the anhydrous form of these inorganic salts.

Chemical Component	Na ₂ B ₄ O ₇ ·5H ₂ O / Na ₂ B ₈ O ₁₃ ·4H ₂ O
U.S. EPA TSCA Inventory	1330-43-4 / 12008-41-2
Canadian DSL	1330-43-4 / 12008-41-2
EINECS	215-540-4 / 234-541-0
South Korea	1-760 / 9312-3213
Japanese MITI	(1)-69 n/a

RCRA: The chemical constituents of *Granubor* are not listed as a hazardous waste under any sections of the Resource Conservation and Recovery Act (RCRA) or regulations (40 CFR 261 *et seq.*).

Superfund: CERCLA/SARA. The chemical constituents of *Granubor* are not listed under CERCLA or its 1986 amendments, SARA, including substances listed under Section 313 of SARA, Toxic Chemicals, 42 USC 11023, 40 CFR 372.65, Section 302 of SARA, Extremely Hazardous Substances, 42 USC 11002, 40 CFR 355, or the CERCLA Hazardous Substances list, 42 USC 9604, 40 CFR 302.

Safe Drinking Water Act (SDWA): The chemical constituents of *Granubor* are not regulated under the SDWA, 42 USC 300g-1, 40 CFR 141 *et seq.* Consult state and local regulations for possible water quality advisories regarding boron compounds.

Clean Water Act (CWA) (Federal Water Pollution Control Act): 33 USC 1251 *et seq.*

- The chemical constituents of *Granubor* are not covered by any water quality criteria of Section 304 of the CWA, 33 USC 1314.
- They are not on the Section 307 List of Priority Pollutants, 33 USC 1317, 40 CFR 129.
- They are not on the Section 311 List of Hazardous Substances, 33 USC 1321, 40 CFR 116.

Canadian drinking water guideline: An "Interim Maximum Acceptable Concentration" (IMAC) for boron is currently set at 5 mg B/L.

IARC: The International Agency for Research on Cancer (IARC) (a unit of the World Health Organization) does not list or categorize the chemical constituents of *Granubor* as carcinogens.

NTP Biennial Report on Carcinogens: The chemical constituents of *Granubor* are not listed.

OSHA carcinogen: The chemical constituents of *Granubor* are not listed.

California Proposition 65: The chemical constituents of *Granubor* are not listed on the Proposition 65 list of carcinogens or reproductive toxicants.

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

16 Other information

- 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).
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- Fail *et al.*, *Fund. Appl. Toxicol.* **17**: 225-239 (1991).
- Price *et al.*, *J. Am. Coll. Toxicol.* **14**: (2), 173 (Abst. P-17) (1995).
- Murray F J, *Regul. Toxicol. Pharmacol.* (Dec. 1995).
- National Toxicology Program (NTP)-Toxicology and carcinogenesis studies of boric acid in B6C3F₁ mice, Tech. Report Ser. No. 324, U.S. Dept. of Health and Human Services. NIH Publ. No. 88-2580 (1987).
- Whorton *et al.*, *Occup. Environ. Med.* **51**: 761-767 (1994).
- Schöberl *et al.*, *Tenside Surfactants Detergents* **25**: 99-107 (1988).
- Hugman S J, Mance G, Water Research Centre Report 616-M (1983).
- 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).

Product label text hazard information*:

- Do not ingest.
- Ingestion may cause reproductive harm or birth defects based on animal data.
- May cause eye irritation
- Avoid contamination of food or feed.
- Not for use in post harvest food, drugs, or pesticides.
- Refer to MSDS.
- KEEP OUT OF REACH OF CHILDREN.

*Except for Canadian product.

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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