

Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

SECTION 1: CHEMICAL PRODUCT - COMPANY IDENTIFICATION

TETRA Micronutrients
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The Woodlands, Texas 77386
(281) 419-9430
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(800) 424-9300 - CHEMTREC (24 Hour Emergency Response)

PRODUCT: MAN-GRO[®] DF+ Plus Boron

SUBSTANCE: Soluble manganese sulfate monohydrate fertilizer micronutrient and trace element for animal feed premixes and industrial chemical use.

TRADE NAMES: MAN-GRO[®] DF+ Plus Boron

SYNONYMS: Manganese Sulfate Monohydrate, Manganese Sulfate, MnSO₄, Monohydrate Manganese Sulfate

CHEMICAL FAMILY: Inorganic salt

MSDS CREATION DATE: 16 FEB 04

MSDS REVISION DATE: 14 NOV 08

SECTION 2: COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENTS: Manganese Sulfate Monohydrate, Boric Acid, Water

CAS NUMBER: 10034-96-5 (Manganese Sulfate Monohydrate), 10043-35-3 (Boric Acid), 7732-18-5 (Water)

RTECS NUMBER: OP0893500 (Manganese Sulfate Monohydrate), ED4550000 (Boric Acid), ZC0110000 (Water)

PERCENTAGE: Proprietary dry blend of manganese sulfate, boric acid and conditioning agent

PROBABLE CONTAMINANTS: None

SECTION 3: HAZARDS IDENTIFICATION

NFPA RATINGS: (SCALE 0-4): HEALTH=1, FIRE=0, REACTIVITY=0

EMERGENCY OVERVIEW: Odorless white to cream-colored powder. Avoid breathing dust. Avoid contact with eyes and skin. Avoid prolonged or repeated contact with skin. Avoid ingestion. Use with adequate ventilation. Wash thoroughly after handling.

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POTENTIAL HEALTH EFFECTS:

INHALATION:

Short Term Effects: May be harmful if inhaled. May cause irritation of the nasal passages. Additional effects may include shortness of breath and asthma.

Long Term Effects: May cause digestive disorders, loss of voice, headaches, difficulty in walking, joint pain, twitching, hearing loss and visual disturbances.

SKIN CONTACT:

Short Term Effects: Prolonged or repeated contact may cause irritation.

Long Term Effects: No information available on significant adverse effects.

EYE CONTACT:

Short Term Effects: Dust may cause irritation.

Long Term Effects: May cause redness and swelling of the eyes.

INGESTION:

Short Term Effects: May cause digestive disorders.

Long Term Effects: May cause irregular heartbeat and kidney damage.

CARCINOGEN STATUS:

OSHA: No

NTP: No

IARC: No

SECTION 4: FIRST AID MEASURES

INHALATION: Remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial resuscitation. Keep person warm and at rest. Treat symptomatically and supportively. Get medical attention immediately.

SKIN CONTACT: Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Wash clothing before reuse. If irritation persists seek medical attention.

EYE CONTACT: Flush eyes immediately with large amounts of water or normal saline solution, occasionally lifting upper and lower lids until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately.

INGESTION: Not an expected pathway in the industrial environment. If vomiting occurs, keep head lower than hips to prevent aspiration. Treat symptomatically and supportively. Get medical attention immediately.

NOTE TO PHYSICIAN: Antidote: The antidote recommended is as for manganese poisoning from Dreisbach, Handbook of Poisoning, 12th Edition. However, the decision as to whether the severity of

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poisoning requires administration of any antidote and actual dose required should be made by a qualified medical personnel.

SECTION 5: FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARD: Negligible fire hazard when exposed to heat or flame.

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, water spray or regular foam. For larger fires use water spray, fog or regular foam (1996 North American Emergency Response Guidebook, RSPA P 5800.7).

FIREFIGHTING: Move product from fire area if you can without risk. Extinguish fire using agent suitable for type of surrounding fire and/or chemicals. Do not use water directly on material. Avoid breathing vapors; keep upwind. Dike area to prevent runoff and contamination of water sources, if possible. Avoid breathing vapors or dust.

FLASH POINT: No data available

LOWER FLAMMABLE LIMIT: No data available

UPPER FLAMMABLE LIMIT: No data available

AUTOIGNITION: No data available

HAZARDOUS COMBUSTION PRODUCTS: Thermal decomposition may release toxic oxides of manganese and sulfur.

SECTION 6: ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL SPILL: Do not touch spilled material. Pick-up dry spills by scooping, shoveling or vacuuming and place into containers for later disposal. Wear protective equipment. Keep unnecessary people away. Isolate hazard area and deny entry to avoid material dispersal. Wash thoroughly after handling. Use with adequate ventilation.

SECTION 7: HANDLING AND STORAGE

Observe all federal, state and local regulations when storing this product. Since emptied packages retain product residue, follow label warnings even after package is emptied.

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SECTION 8: EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

Manganese and/or Manganese Compounds:

- 5 mg (Mn)/m³ OSHA ceiling
- 5 mg (Mn) /m³ ACGIH ceiling (dust)
- 1 mg (Mn)/m³ ACGIH TWA (fume)
- 3 mg (Mn)/m³ ACGIH STEL (fume)

[Measurement method: Particulate filter; gravimetric; (NIOSH III Nuisance dust # 0500 (total), #0600 (respirable).]

VENTILATION: Provide local exhaust ventilation system to meet published exposure limits.

EYE PROTECTION: Wear safety glasses with splash shields or safety goggles/shield to prevent contact with this product.

EMERGENCY WASH FACILITIES: Where there is any possibility that an employee's eyes and/or skin may be exposed to this product, the employer should provide an eye wash fountain and quick drench shower within the immediate work area for emergency use.

CLOTHING: Wear appropriate protective clothing and equipment to prevent repeated or prolonged skin contact with this product.

GLOVES: Wear appropriate protective gloves to prevent contact with this product.

RESPIRATOR: The respirator selected must be based on contamination levels found in the work place and specific to the job assignment. Do not exceed the working limits of the respirator. Respirators must also be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA)

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

DESCRIPTION: Odorless white to cream colored powder

MELTING POINT: Not available

BOILING POINT: Not applicable

SPECIFIC GRAVITY: (H₂O=1): 0.87 at 20/20 C

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VAPOR PRESSURE: Not applicable
VAPOR DENSITY: Not applicable
WATER SOLUBILITY: Appreciable (approx. 100%)
pH: 3.0 – 5.0 @ 10% solution

SECTION 10: STABILITY AND REACTIVITY

REACTIVITY: Stable under normal temperature and pressures
CONDITIONS TO AVOID: None known
INCOMPATIBILITIES:
 Acids (Strong): Incompatible
HAZARDOUS DECOMPOSITION: Thermal decomposition may release toxic oxides of manganese and sulfur.
POLYMERIZATION: Hazardous polymerization has not been reported to occur under normal temperatures and pressures.

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICITY DATA (Manganese Sulfate):

LD₅₀ (anhydrous): 332 mg/kg, intraperitoneal, mouse; mutagenic, reproductive effects, tumorigenic data-see Registry of Toxic Effects of Chemical Substances (RTECS) file.

(monohydrate): mutagenic, reproductive effects data (RTECS).

LD₅₀ (tetrahydrate): 534 mg/kg, intraperitoneal, mouse; mutagenic data (RTECS).

CARCINOGEN STATUS: None.

ACUTE TOXICITY LEVEL: Insufficient data.

TARGET EFFECTS: No data available

HEALTH EFFECTS:

INHALATION (Manganese Sulfate): 10,000 ppm (Mn) immediately dangerous to life or health.

Acute Exposure: Exposure to the dust of manganese compounds may cause irritation of the mucous membranes with symptoms of coughing and shortness of breath. This material may be absorbed into the blood stream and deposited into the liver, spleen, brain and other organs where it accumulates.

Chronic Exposure: Repeated exposure to the dust of manganese compounds anywhere from 3 months to 2 years, may produce chronic manganese poisoning. The early stage of this disease is insidious with symptoms of apathy, anorexia, asthenia, headache, hypersomnia, spasms, weakness of the legs, arthralgias and irritability. As the disease progresses into the intermediate phase, psychosis develops with symptoms of visual hallucinations, double vision, impaired hearing, uncontrollable

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impulses, mental confusion, and euphoria. In the last stage of the disease, neurological disturbances develop that simulate Parkinson's disease. These disturbances include excessive salivation, muscle weakness, muscle rigidity, tremor of upper extremities and head, and impaired gait. The severity of chronic manganese poisoning depends upon the length of exposure and the stage of the disease when exposure is terminated. The prognosis is more favorable in the young and in those with only a few years exposure. Chronic manganese poisoning is not a fatal disease but it can be extremely disabling.

SKIN CONTACT (Manganese Sulfate):

Acute Exposure: May cause irritation.

Chronic Exposure: No data available.

EYE CONTACT (Manganese Sulfate):

Acute Exposure: May cause redness and irritation.

Chronic Exposure: Repeated or prolonged contact may cause irritation and conjunctivitis.

INGESTION (Manganese Sulfate):

Acute Exposure: Manganese compounds may cause gastrointestinal disturbances with abdominal pain and nausea. Large inhaled particles may be cleared from the respiratory tract and swallowed. The rate of absorption can be influenced by the dietary level of manganese and iron, the type of manganese compound, iron deficiency and age. However, the risk of intoxication by this route is not considered great.

Chronic Exposure: No data available.

TOXICITY DATA (Boric Acid):

ACUTE ORAL LD 50: 3500-4000 MG/KG of body weight (Rabbits)

ACUTE DERMAL LD 50: >2,000 mg/kg of body weight (Rabbits)

ACUTE INHALATION LC 50: >2.0 g/m₃ (Rats)

CARCINOGENIC: Not known to be carcinogenic

MUTAGENIC: Not known to be mutagenic

EYE/SKIN IRRITATION: Non-irritant in normal industrial use

PRINCIPLE ROUTES OF ABSORPTION: Oral, Skin, Inhalation

EFFECT OF ACUTE EXPOSURE: Nausea, vomiting, diarrhea, gastrointestinal effects, redness or peeling of open skin. May cause mild throat and nose irritation.

EFFECT OF CHRONIC EXPOSURE: None expected at industrial use levels

SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL IMPACT RATING (0-4): No data available.

ACUTE AQUATIC TOXICITY: No data available.

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DEGRADABILITY: No data available.

LOG BIOCONCENTRATION FACTOR (BCF): No data available.

LOG OCTANOL/WATER PARTITION COEFFICIENT: No data available.

SECTION 13: DISPOSAL INFORMATION

Observe all federal, state and local regulations when disposing of this substance.

SECTION 14: TRANSPORT INFORMATION

DOT Shipping Name-ID Number: Non-regulated.

SECTION 15: REGULATORY INFORMATION

	TSCA STATUS:	Yes
40 CFR 302.4	CERCLA SECTION 103:	No
40 CFR 355.30	SARA SECTION 302:	No
40 CFR 355.40	SARA SECTION 304:	No
40 CFR 372.65	SARA SECTION 313:	Yes
29 CFR 1910.119	OSHA Process Safety	No
	California Proposition 65	No
40 CFR 370.21	SARA HAZARD CATEGORIES, SARA SECTIONS 311.312:	
	ACUTE HAZARD:	No
	CHRONIC HAZARD:	No
	FIRE HAZARD:	No
	REACTIVITY HAZARD:	No
	SUDDEN RELEASE HAZARD:	No

SECTION 16: OTHER INFORMATION

Individuals handling this product should be informed of the recommended safety precautions and should have access to this information.



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This information relates to the specific product designated and may not be valid for such product used in combination with any other materials or in any other processes. Such information is to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability, or completeness. It is the user's responsibility to satisfy themselves as to the suitability and completeness of such information for their own particular use. We do not accept liability for any loss or damage that may occur from the use of this information nor do we offer warranty against patent infringement.

TETRA Micronutrients reserves the right to refuse shipment of this product to any consumer who fails to demonstrate the ability to consistently handle and use it safely and in compliance with all applicable laws, rules and regulations. Such demonstration may require on-site inspection of any or all storage, processing, packaging and other handling systems that come in contact with it.

Customers are responsible for compliance with local, state and federal regulations that may be pertinent in the storage, application and disposal of this product.